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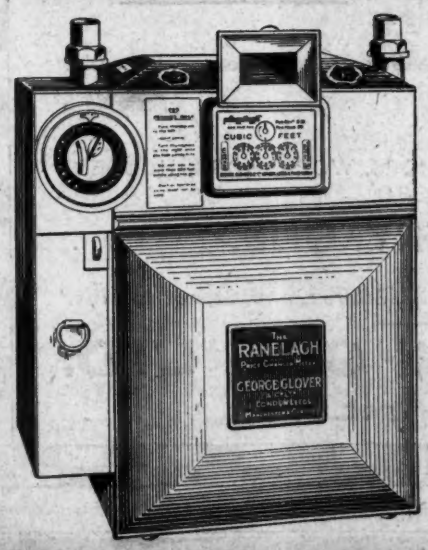

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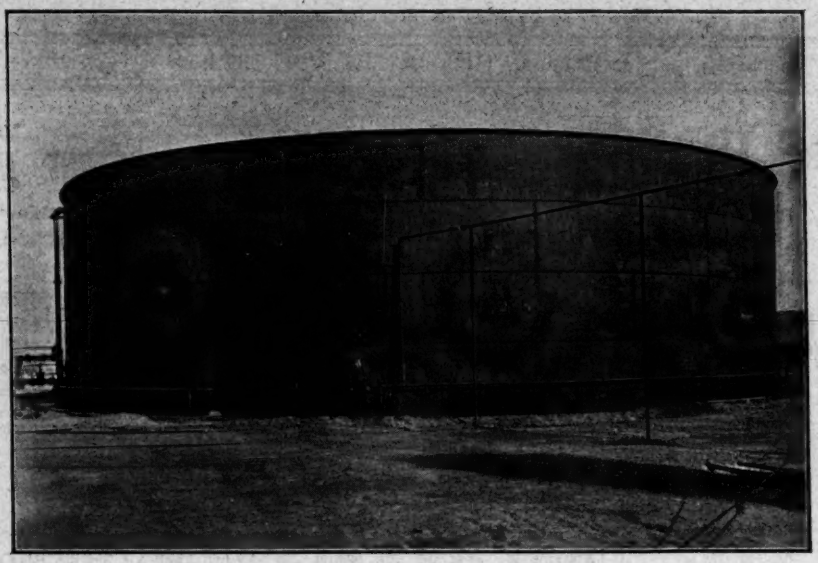

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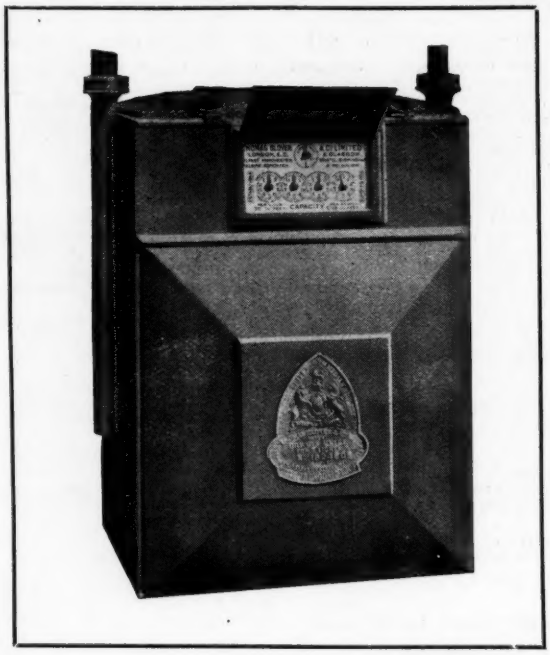

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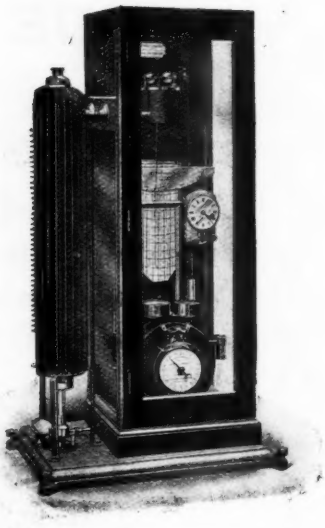

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VOL. CLIX., No. 3095.] WEDNESDAY, SEPTEMBER 6, 1922. [74TH YEAR.

EDITORIAL NOTES.

Keeping the Therm Agitation Alive.

THE Chairman of the Barnet Gas and Water Company (Mr. A. F. Phillips, M.Inst.C.E.) has had public attention thrust upon him. He did not seek it; he is one of the last men in the whole gas world to look for notoriety. But he gave the newspapers an opportunity which the expiring public interest in the subject of therm charges required. It all came about through a little expression of personal opinion, which is not shared by all equally competent gas men, while it is by some others. It was that "he could not "help feeling that it would have been better to continue to "charge by the 1000 c.ft. [instead of by the therm]; the "gas being of a stipulated value." This would have undermined much of the salutary influence there is in the therm. There has always been trouble with consumers over the variation in prices between one district and another. Under the therm system, there will still be a difference; but some of the divergence in price that existed under the old cubic feet method of charging was due to the variation in the calorific value of the gas supplied in different areas. And it is a troublesome thing to get consumers to realize that gas of 500 B.Th.U. per cubic foot should cost more per 1000 c.ft. than gas of (say) 400 B.Th.U. Moreover, there is on the therm basis better comparison everywhere of consumption for doing certain work than on the cubic feet basis with gas of different thermal value. The therm is a constant quantity; and it has come to stay.

Mr. Phillips made it clear, but some of the papers did not publish all he said on the point, that consumers' accounts would have been no less if charged at per 1000 c.ft. than charged by the therm. But inconvenient points of this kind would have lessened the value, to the section of the Press that endeavours to get the public to rebel, of the expression of personal opinion as to feeling that it would have been better to continue to charge by the 1000 c.ft. It is pandering to custom, and not supporting progress, to hold that view, though, of course, everyone is entitled to his own opinion. A consumer asked us the other day: "What is a therm?" and he expressed the view that he preferred being charged by cubic feet. This was merely the result of the Press campaign. Before explaining the therm, we asked the consumer to define a "cubic foot." He could not. We then asked him to define an electrical unit. He was more than ever at sea. As a matter of fact, so far as general public knowledge goes, the basis of charge does not matter a tittle. The change is one marking progress—the change to purchase on actual value rather than on volume of a value varying in different places. If convention ruled, there would be no advance in human affairs. We should still be using horse trams and omnibuses, and cabs with a poor specimen of the equine species in the shafts. It would have been of interest to the public if the papers had published the fact that the Barnet Company applied for the change to the system, had obtained it, and was working under it, despite the feeling of the Chairman. But quite possibly the Company did not do this because they believed the change was preferable, but because it was the only way to secure a restoration of the dividend. This is an answer to those critics who profess to know all about these matters, but who disclose their utter ignorance when they aver that gas companies pressed for the change. In many cases, naturally the charge for gas is somewhat higher than before, in view of the fact that one of the objects of the Gas Regulation Act was to restore to the capital of gas undertakings a fair but not extravagant dividend, which had in numerous cases dropped during the war to £2 12s. 6d. and 3 p.ct. But though more money is required to pay the dividends now, no one can accuse gas undertakings of paying dividends which would satisfy people in other commercial undertakings.

The matter of the therm and its supposed account-developing propensity has been introduced in many places. It got into the House of Commons before the adjournment; and we now see that one intelligent provincial paper suggests that it be made a subject for parliamentary handling with an eye on the next General Election campaign. "With a General Election in view," remarks the paper, "members may bestir themselves on this thorny subject "when Parliament resumes its work."

Another feature of the past week has been that the South Metropolitan Gas Company have been, in the principal London papers, advertising on a large scale, "The Truth "about Therms." The advertisement is generally useful to the industry, though in part it has reference to the South Metropolitan Company's own figures. Possibly it may have occurred to some that this was essentially a matter for the British Commercial Gas Association. But so far they have not moved in the matter—at all events with any attractive prominence; and the action of the South Metropolitan Company rather serves to emphasize the fact. However, there have been signs that the public are beginning somewhat to sicken of the attack upon the therm. They know little about it; and many care less. The papers felt, however, that they had to do something to keep the matter alive; hence the publicity given to Mr. Phillips' remark at the meeting of the Barnet Company. No one has been more surprised over this than Mr. Phillips himself.

Press Correspondence and Electrical Publicity and Attack.

A GOOD deal of finesse is being introduced into electrical propaganda in these times. We have pointed out before, and it has not been denied, that there is reason to believe that in the high gas accounts *cum* therm controversy, the publicity agents of the electricity industry have been busily engaged. They have been overdoing it to such an extent that they have been brought to book in the "Bulletin" of the British Commercial Gas Association. Several editors of papers—London and provincial—appear to have been taken-in by this specious form of correspondence; and we hope that the "B.C.G.A." will call their attention to what has taken place.

There is one correspondent, signing himself "A Dutch-"man," who is a prolific writer; and no doubt as he pens his missives to the unsuspecting editors, he laughs at the ease with which he finds that "A Dutchman" can use British journalists as tools in the interests of the British electricity industry. The "Bulletin" quotes a letter from this gentleman that appeared in April under four different headings in four different papers—"The Hull Daily Mail," "Birmingham Daily Post," "Sheffield Daily Telegraph," and "The Times Trade Supplement." The letter began with the information that the writer had just returned from a fairly comprehensive trip in certain countries on the Continent. It is interesting to mark this. Then the "Dutch-"man" took a rest; but he reappeared in the "Evening "News" on Aug. 11 with a letter on "The Expensive "Therm." This communication concluded with the statement: "On the Continent in many parts electricity is

"replacing gas for heating and cooking; and this would "seem the simplest solution for many gas consumers here, "as a decided move towards electrical heating by a "good number of consumers will influence gas companies "far more than Government inquiries." This ubiquitous Dutchman is found with letters on the same or the next day in the "Western Morning News and Mercury," "Leeds "Mercury," "Glasgow Herald," and "Birmingham Daily "Post"—the headings to the letters being variously "Charges for Gas," "Electricity or Therms," and "Price "and Quality of Gas." The letter was the same in these four cases; and among the paragraphs—note this!—was the "On the Continent" one quoted above from the "Evening "News."

The electrical propagandists appear to like foreign writers of letters. Another is signed "A Belgian Reader;" and it was published in the "Newcastle Daily Journal" and the "Sheffield Daily Telegraph." Following-up letters are said to be good commercial enterprise; and so "Mrs." P. Martinez followed up the "Dutchman's" letter, published on April 3, with one in the "Birmingham Daily Post," the "Sheffield Daily Telegraph," and "The Times Trade Sup-"plement"—the same letter under three different headings. In that letter she referred to "Latin America." In the "Sheffield Daily Telegraph" later, appeared one signed "America Latina," in which the Hackney electrical exhibition was referred to. "Mrs." P. Martinez obtained the insertion of a letter in "The Times" on July 12. In this, allusion was also made to the Hackney electrical exhibition! Another letter is by "A Foreign Correspondent;" and others have also the appearance of being the work of electrical writers.

There is abundant evidence in the letters specially mentioned in this article that shows common sources of origin, and that "broadcasting" of these artful effusions—some with fictitious names attached—is part of the electrical publicity campaign in favour of electricity and antagonistic to gas. The "B.C.G.A.," we have no doubt, will take steps to deal with this method of cheap electrical advertising and veiled attack on a competitor; and gas officials should also communicate with local editors to put them on their guard against this form of opportunist propaganda. The paid advertisement columns are the proper place for advertisement of the kind. We do not happen to have a book on the ethics of propaganda, or we would gladly lend it to some of the electrical letter-writers and agents.

To Improve the Ammonia Yield.

IN this week's issue, we commence the publication of a paper read by Mr. H. D. Greenwood and Mr. H. J. Hodsman, of the Department of Coal Gas and Fuel Industries, at the Leeds University, on the factors influencing the ammonia yield in the carbonization of coal. It is highly important—in view of the fact that synthetic ammonia now assails, and will do so in increased measure, the ammonia product from the carbonization of coal—that those factors should be unearthed, and should become more intimately known, in order to increase the yield of ammonia per ton of coal handled, by augmenting the proportion of nitrogen liberated as ammonia, or by preserving the ammonia once formed from destruction in or after leaving the retort or oven. At the present time, under the best of conditions, the yield of ammonia in normal carbonizing practice represents but a relatively small proportion—from (say) one-seventh to one-fifth—of the nitrogen in the coal. This is very small; and therefore all investigation that will help to secure improvement is heartily welcomed, and should be encouraged—such investigations as those of the present authors and of Dr. Monkhouse and Prof. Cobb as presented at the last meeting of the Institution of Gas Engineers. There is a considerable difference of opinion among the authorities as to whether oxidation is more important than dissociation in causing losses of ammonia. This is the work upon which the investigators mentioned above are engaged. Dr. Monkhouse and Prof. Cobb are dealing with the liberation from coal and coke of nitrogen in the form of ammonia, and Messrs. Greenwood and Hodsman are inquiring into the *rôle* of oxidation.

The results of the work in this connection of the two former investigators will be found in the Institution numbers of the "JOURNAL," and in this issue publication is given to the first part of the paper by the two latter investigators. The material they present is considerable, and its details require to be studied. But in the second part of the paper there is a concise summary of the conclusions, which it may be useful to bring into prominence, simultaneously with the first instalment, pending their later publication. In the first place, examination has been made regarding the destruction of ammonia at low partial pressures and in atmospheres of air, of nitrogen containing 1 to 2 p.ct. of oxygen, and of coal gas containing oxygen, at temperatures up to 800° C., in the presence both of fused silica and unused fireclay brick. It is found that the oxidation of ammonia in air and in contact with the fireclay brick under the conditions of the experiments is distinctly retarded by water vapour present even in small proportions. In coal gas containing oxygen, the destruction of ammonia is much less marked at corresponding temperatures than with air; and this destruction, owing to the preferential union of the oxygen with the hydrogen, &c., present in the coal gas, is due, not to oxidation, but to a process of dissociation. In these experiments no marked influence of water vapour was observed. It is doubtful whether direct oxidation of ammonia occurs to an appreciable extent during carbonization, even when oxygen is present. The known deleterious effect of air indrawn during carbonization and gasification is, therefore, presumably due to the local overheating of the gas following upon the union of the oxygen with combustible constituents. The rise in temperature then facilitates dissociation. In the opinion of the authors, it remains to be proved that a preservative effect can be ascribed to the large volume of water vapour in coke-oven gas—*i.e.*, as distinct from that due to dilution and shortened time of contact of the ammonia. The experimental work is being pursued, and the further results will be awaited with considerable interest.

The Miners and Oil from Coal.

IT is a curious thing that certain of the coal miners' leaders appear to take an immense, if superficial, interest in low-temperature carbonization, and the production of oil from coal so treated. We remember at the time of the sittings of the Sankey Committee, the late President of the Miners' Federation (Mr. Robert Smillie) predicted all sorts of good things happening if much of our coal was treated in the manner proposed. Now Mr. Frank Hodges, the Secretary of the Federation, is following suit. Naturally the miners do not want to see imported oil successfully competing for fuel purposes with native coal; and therefore the next best thing is, as the use of oil fuel cannot be stayed, and is bound to develop, that oil should be home produced, as far as possible, and the source of that oil be coal. This is a very rational view to take—by the miners; and we quite agree that this country, in view of the importance of oil, ought not to be solely dependent, or largely so, on overseas supplies. With submarines successfully active, we were in the late war frequently on the brink of grave disaster. But in considering this matter, it is folly to have a too exaggerated opinion as to what can be achieved in this connection from the carbonization of coal. Much can be done, but that much is not equal to our home requirements. There is also practicability to be considered; and it is impracticable to convert, except by gradually progressive work, all the heating appliances—domestic and industrial—that at present call for the use of solid fuel. It would take years and years to do this; and meantime we may be faced—but heaven forbid!—with another terrible war.

However, as said, Mr. Frank Hodges has taken up the advocacy, from the miners' standpoint, of the carbonization at low temperatures of coal for the purpose primarily of obtaining the oil the country requires—oil of all kinds, especially fuel oil and motor spirit. His advocacy has taken the shape of an article to the "Manchester Daily Dispatch." It is not surprising that Mr. Hodges knows little about the commercial factors that so largely govern low-temperature carbonization of coal. They are believed to be improving, in view of the rich gas that would be made available for the thermal enrichment of low calorific power town gas. This, however, is only one of the elements in the question that call for consideration. But these are not matters that trouble the novice in this regard. There is the elementary fact that oil can be produced from coal, and the largest quantities by low-temperature carbonization. Technical, commercial, and practical obstacles do not stand in the path of Mr. Hodges. At the same time his interest is quite a legitimate one; the trouble is that he does not go

far enough. The result is that his optimistic views are doomed to destruction—anyway, they are not likely to materialize other than partially within the span of his life. He asserts in his article that we have in our coal deposits all the oil and more not only to meet the actual requirements of the country, but to export a large surplus abroad. No doubt we have in our coal "deposits." But the coal deposits can only be dealt with in an economic manner. This is very essential. They are a wasting asset; and we must expend them as frugally as possible. What is in the "deposits" is one thing; what can be made economically available is another. To make oil economically available from coal, all the other commodities yielded by the coal must be in profitable demand to the extent of the quantity carbonized. All coal cannot be dealt with by the low-temperature process, simply because there are commodities produced from coal which can be more economically obtained at high temperatures, and then the oil produced per ton of coal drops to a lower level, and different results and oils and derivatives of different properties are obtained. It is quite true that some of the best brains of the country are engaged upon this problem of the extraction of oils from coals; but they know that, unless the extraction is carried out in a manner that will enable a good revenue to be realized from the other products, the oil could not be produced to compete in price with imported oil. And imported oil has dropped greatly in price.

However, Mr. Hodges believes that the problem has been actually solved in a practical manner to assure our future as an oil-producing nation; and now from the carbonization of slack alone, at low temperatures, rich gas, smokeless fuel, and 15 to 20 gallons of oil are produced. From this oil motor spirit and lubricating and heavy oils are obtained. Mr. Hodges appears to have fallen into the error of assuming that all coals will produce good quantities of oil per ton. Their yielding capacity varies as much as the efficiency and ability of men. If, says Mr. Hodges, a quarter of the coal raised in this country were successfully treated at low temperature, more than the total annual consumption of motor spirit would be produced. If small coal is taken and mixed with heavy oil, as much as 80 gallons per ton have been extracted! Really Mr. Hodges is too optimistic. Not even if the whole of the coal—a quarter would not go far—now burned in this country in the raw state (amounting, after deducting coal the use of which cannot be avoided, to some 139 million tons per annum) were carbonized, would there be enough motor spirit available for present needs. However, before we can reach the maximum degree of possible oil production, the whole of the coal consuming appliances in the country must be converted to gas or solid smokeless fuel heating. That would no doubt be an excellent thing. But Mr. Hodges' optimism sadly needs to be tempered by a greater knowledge of actual facts.

The Government Smoke Abatement Proposals.

In not a few quarters, the Government Smoke Abatement Bill has been received with something like derision. When noticing it in the "JOURNAL" on a previous occasion, it was suggested that it would be unacceptable to those who are out for securing a greater purity of the atmosphere, as really it is little more than an amendment of the Public Health Act of 1875—dealing only with industrial smoke, and making no provision for encouraging the abatement of domestic smoke. This is still to be left entirely to the enterprise of those vending smokeless fuel agents, or to individual assistance—deliberate or otherwise. Those interested in industry refer with an amount of irony to the fact that high authorities in the matter of air sanitation assert that nearly four-fifths of the total pollution of the air is due to domestic smoke, which leaves only about one-fifth chargeable to industry. In view of this, naturally they do not like the tightening-up upon industry in this particular matter, as proposed by the Bill. The "Fuel Economy Review" of the Federation of British Industries indicates that, scrutinized from the side of the manufacturers, the Bill is oppressive and full of danger; and, as a matter of fact, it seems to presuppose that the manufacturers are not doing anything towards moderating the emanations of their chimneys; while as a matter of fact they are, but reformation, where it is needed, is a question of time.

Of course, legislation of this kind is necessary not for those who are doing well, but for those who are lethargic in respect of their duty in this particular. But those who are doing well, regard as drastic one amendment that is being made in the Act of 1875. As previously pointed out, it is proposed to cancel "black smoke" as a cause of nuisance, and insert "smoke, grit, soot, ash, and gritty particles." This extension is considered an unwarrantable imposition. It is, up to a point; but not all manufacturers are prepared to adopt, or do adopt, those means that are necessary and available to ensure immunity from trouble through nuisance of any one kind mentioned. It is, for example, pointed out by the "Fuel Economy Review" that a manufacturer may be liable to prosecution not by reason of inefficient plant nor for inefficient working, but solely by being supplied with unsuitable fuel, respecting which he may have had no choice. This, however, is not a sufficient reason to-day, as most manufacturers can now make a selection of coal; and, as some gas undertakings have shown, there are collieries that are not averse to inserting in contracts clauses providing that ash shall not exceed a given figure, and others have a sliding-scale of deductions from contract price for ash exceeding a given maximum. Of course, there is the consideration that there must be an outlet for low-grade fuel and slack, in order to assist in the economical working of the coal industry; and that outlet is industry. Complaint is further made that the Bill has been conceived in the belief that industrial establishments wilfully pollute the atmosphere, which shows a very small acquaintance with the factors affecting the utilization of fuel in industry. As research and development proceed, leading to greater fuel economy and better application, the smoke nuisance, so far as industry is concerned, will abate; and it is only through this channel that any definite and efficacious movement can be effected. Plant modernization costs money; but there is the *contra* of fuel economy. Economy will be imperative in industry; and plant has not perpetual life. We may therefore look to the contribution of industry to the smoke nuisance as being prospectively a diminishing quantity, which will be supplemented by better trained firemen and supervisors. On the question of economy, it has been pointed out by Mr. W. H. Casmey that three minutes' smoke per hour indicates a loss of 1 p.ct. of the fuel used during that time, so that a firm whose boilers are consuming 2 tons of coal per hour, and whose chimney emits smoke for nine minutes, loses 134 lbs. per hour, or 3 tons for a week of fifty hours. Therefore, if three boilers were using the 3 tons of coal mentioned, the loss from smoke alone would be at the rate of 50 tons per boiler per year. Users of coke in conjunction with coal find a great advantage—not only in economy, but in the reduction of the emanations from boiler-house stacks. However, with the Bill raised to the status of an Act, manufacturers will no doubt, as opportunity allows, be glad enough to avail themselves of any advice that the Fuel Research Board and the Fuel Economy Department of the Federation of British Industries can impart.

There is one other complaint from industry. It has relation to the fact that Government factories are exempt from prosecution under any of the clauses of the Bill. It is pointed out that, in view of the attempts to extend the functions of Government factories into the spheres of private trading, such indulgence would give rise to another factor of unfair competition. An illustration is given. A Government power station has recently been permitted to supply a local authority in bulk; its chimney is outside the law. The gas company supplying in the same area is liable to legal proceedings even though its chimney may be emitting less smoke than that of the Government factory. The Government factory ought to set an example, and not be privileged. Altogether, industry is of opinion that the Bill is an ill-conceived one; and there are signs that strong opposition will be offered to it in Parliament.

The Model Gas Bill.

There is as yet nothing definite available as to the modifications that are likely to be made in the Model Gas Bill. Time is passing; and those gas managements who will be applying for additional powers next session, and so have to be considering preparations, would like to ascertain as early as possible what changes are to be made. Whatever variations are effected in existing clauses, or whatever new introductions are made, would apply to applications under section 10 of the Gas Regulation Act. There are, of course, several clauses of the Model Bill that require amendment; and there are to-day additional powers that should be inserted. The changes relate to financial

and supply matters. While nothing definite, so far as we can learn, has yet been done, the Lord Chairman is giving careful consideration to any suggestions that are submitted to him, together with the reasons for making them. The National Gas Council have proposed various changes; and they have done so on very good grounds. While in all cases the proposals, if adopted, would be useful, it can hardly be hoped that every one of them will secure the approbation of his Lordship and his advisers. But it is believed that several of the suggestions will meet with acceptance. Amendments have been submitted dealing with the special purposes fund, the sliding-scale, discounts, specifications as to pipes, supply of gas-fittings, and expenses of reconnecting supplies. Additional clauses that have been submitted relate to the obligations as to the supply of gas, mode of cutting-off supplies, power to lay pipes for ancillary purposes, additional powers of borrowing in respect of existing and authorized capital, power to create renewal funds, authorization as to the offering of shares or stock for subscription, and proof of service of notices upon consumers.

Sulphur v. Pyrites.

We recently referred to the change that is taking place in the greater utilization of the sulphur from spent oxide, together with American sulphur, in lieu of pyrites, in the production of sulphuric acid. The "Engineer" refers to the change as being "of some significance and withal not without sinister import to certain mining interests." The permanence of the change from pyrites to sulphur will depend on the persistence or non-persistence of certain economic facts. Not altogether. The change necessitates differences of plant; and plant conversion takes time and money. Moreover, the war has taught us the lesson that reliability of supplies of the raw material is not without national importance. However, our contemporary emphasizes the fact that the various European pyrites mining companies have large interests at stake. It asks, Will they take the new competition—the American is particularly mentioned—placidly, or will they recognize that immediate counter measures are necessary for self-preservation? "The main factor, of course, is the price to the buyer per unit of available sulphur; and it now remains to be seen whether the gauntlet thrown down by America will be taken up in Europe. At the moment it is cheaper to buy American sulphur than European pyrites; and therefore it is being bought. The next word, therefore, lies with the pyrites producers."

Goodwill the Real Motive Power.

An important manifesto was issued last week, signed by many men of great prominence in the political and industrial worlds. It urged the supreme necessity at the present time of goodwill among men in the industrial as well as in the political sphere. Also that co-operation is a vital necessity if we are to gain a world of peace, prosperity, and happiness. If people are concerned, in their individual capacity, with struggles and quarrels, if in industry they attach more importance to personal questions than to those that are vital to the well-being of the community, they create an atmosphere in which ill-feeling is the dominant factor, they divide themselves into camps, and they look at every question from the view-point of their own individual preferences. The result is that industry suffers; and with it human relationships suffer. Later in the manifesto it is submitted that we in Great Britain have the factories, the works, the skilled men, the able direction. One of the most vital things wanting is the goodwill which is the real motive power. If we are to obtain it, every class, employer and employed alike, must admit the theory of personal responsibility, and must endeavour to fulfil its obligations. That is all good. But the ideals that underlie the excellent advice are, it seems to us, impossible of attainment while the elements in the organizations of the workers of the country are so vastly antagonistic, and those who have supremacy in the direction of the policy of labour are men to whom the doctrine of goodwill among men and co-operation in industry would be totally repugnant, in view of the enmity that such doctrine has to the attainment of their own destructive ends.

Depression in Trade Unionism.

With the return of the Trade Union Congress, the facts of the position of trade unionism to-day are being brought into prominence. The trade unions have been suffering badly from atrophy. To a large extent this is due to an overtaxing of their own strength; and in some degree, of course, it is owing to industrial depression, which the unions have been the means of aggravating by the looseness and exuberance of their demands and the means taken to enforce them. All the important unions —the miners, the railwaymen, engineers, agricultural workers, and the various labourers' unions—show a smaller membership than a year ago. Unemployment has also been making a drain on the funds of the unions; and with unemployment, the capacity of many members to pay their subscriptions has disappeared. Quite a number of unions have therefore been compelled to stop the payment of their ordinary benefits until such time as reserves have again accumulated. They are in a sorry condition at present. Will the lessons of the last few years have any durable good effect? There has not been much goodwill and co-operation in evidence during those times, nor will there be until trade unionists dismiss from their leadership those whose policy and aims are purely destructive.

Unemployment.

Speaking of unemployment, the official returns show that on Aug. 21 the live registers of the labour exchanges recorded that the number of persons wholly unemployed was 1,333,700. This is 490,033 less than at the beginning of January, and 1583 more than in the preceding week. The number working short time and drawing benefits for intervals of unemployment was 65,100, as compared with 934,786 on July 1, 1921. But that was as the coal strike came to an end.

A Living "Wage" for Collieries.

Trade unionists talk much about a living wage. Their estimates as to what is a living wage vary immensely; but the Stanton Coal and Iron Company have concluded that there is a living "wage" for the collieries below which they cannot continue to operate. Consequently, the Company have shut-down their Silver Hill Collieries, giving as the reason for doing so that it is hopeless to continue the pits at the present wage rates to the men, who have made no offer to accept a reduction. Trade unionists, generally speaking, are not given to look at this matter from the point of view of whether at the rate of wages they demand the employment can be continued. The output of the Silver Hill Collieries is used for the supply of the Company's iron-works. If output is not of an order that justifies the total amount of wages paid, an iron-works drawing from such a mine can often more profitably secure coal supplies from mines working more nearly to normal capacity at a cheaper rate—the lower price resulting from the overhead charges being spread over a greater output. Competition in the iron and steel trade is very keen at present; and therefore owners of such works are bound to get their requirements of coal at the lowest possible price. The action of the Stanton Company has no doubt been forced upon them, in order to place them in a better position to compete in the markets of the world.

Gas Coal Position.

In the United States the dispute with the coal miners is said to be practically ended, so that gradually this country will be liberated from demands for coal from that quarter, and there will be greater availability of gas coal supplies for home—not that there is any great pressure at present. Of course, the coal owners and the miners do not wish to see an end to the business with the United States; and they will now welcome any trade they can get from Canada. The considerable demands upon the collieries in Durham and Northumberland, through the plethora of orders for overseas, are keeping them very busy there for the time being; and therefore it may be said that in that quarter new dealings and business are fairly quiescent. Nevertheless, quotations for the best grades are being upheld at from 24s. to 25s. per ton. The inquiry for other classes of coal has had an upward turn; and business has been done at a few pence below 23s. The reports from the Yorkshire markets are not altogether consistent. On the one hand, the demand for the best sorts is said to be heavy; while another report informs us that, while there is a better tendency, the position is not altogether such as is desired, and that large supplies are available. Lancashire, Cheshire, and North Wales report more invitations for tenders for gas coals, and already good supplies are being distributed under contract.

From other markets it is learned that gas-works are taking deliveries with greater freedom—of course, a good proportion being for stocking purposes in preparation for winter consumption. Gas coke appears to be going off well; and the outlook is one that is regarded as favourable for gas-works.

Canada's Coal Custom.

The United States will be gradually slackening-on as a customer for British coal; but Canada will probably develop a fairly considerable patronage during the next few months. There are grave fears there as to a coal famine in the winter; and action is being taken by organized means to do all possible, by the aid of coal from Great Britain, to avert disaster.

Contracts and Low Outputs.

There has been a great deal of discussion and much surmise as to why it is America has been able to secure a contract for tramway rails from the Glasgow Corporation at £15,300, against £18,200 asked by British firms. The most favoured explanation is that the output of the American worker is much greater than that of the British worker.

PERSONAL.

Mr. RONALD DALLY, who took his B.Sc. degree in Gas Engineering at the University of Leeds in July last, has been appointed Research Chemist on the staff of Mr. Harold E. Copp, at the Hull works of the British Gas Light Company. Mr. Dally, who is thirty years of age, received his school training at the Skipton Grammar School, and after two years' private study and a further two years' office experience was on active service from 1915 until the end of the war, at which time he went to the University of Leeds and entered on the degree course in Gas Engineering. He has had vacation works experience at the Leeds Gas-Works, with Mr. C. S. Shapley, the Engineer and General Manager.

Mr. C. S. SHAPLEY (Engineer and General Manager of the Leeds Corporation Gas Department), while driving a car, with his wife and Mr. JAMES T. RANDALL (Secretary of the Southend Gas Company) and Mrs. Randall, had a nasty collision with a motor lorry a night or two ago at Catch-em Corner, on the Harrogate and Skipton Road. Mr. Shapley's car was overturned and completely wrecked; but we are glad to learn that the occupants were not seriously hurt.

The announcement is made by the Directors of the Hathersage and District Gas Company, in their annual report, of the death of their esteemed colleague, Mr. ROBERT HALL, who had been a Director and Secretary of the Company from its formation. To fill the vacancy created on the Board, they have elected Mr. T. H. BROWN (Engineer and Manager to the Company). Mr. A. WRIGLEY, of Matlock, who was associated with the late Mr. Hall for some years, has been appointed Secretary.

Mr. and Mrs. A. E. BROOKS, of Ascot, recently celebrated their silver wedding, and received the cordial congratulations of their many friends. Mr. Brooks has been Engineer and Manager of the Ascot District Gas and Electricity Company for the past 24 years, and to mark the occasion the Directors of the Company presented him with some valuable silver plate.

Mr. S. J. INGRAM, Engineer and Manager of the Truro Gas Company, has had the gratification of being appointed by the Board Managing Director and Engineer. The appointment as Director is subject to confirmation by the proprietors at the next annual general meeting.

Mr. ELI FROST, of the Churnet Valley Gas Company, Froghall, has secured, out of over 80 applicants, the position of Engineer and General Manager to the Narborough, Enderby and Blaby, and Whetstone Gas Light and Coke Company, Ltd. Mr. Frost was educated at the Lady Manner's Grammar School, Bakewell, and afterwards at the Dealey Technical College. He was articled to the Matlock Bath Gas and Water Engineer for a period of nine years in all the departments connected with the manufacture and distribution of gas and working-up of residuals. Previous to coming to Froghall, of which works Mr. Frost had the sole supervision of erection, he had held the posts of Manager at Mullingar, Roscrea, and Kirton. Mr. ARNOLD EDWARD FROST, at present Gas Manager at Brownhills, has been appointed to the vacancy thus created at the Froghall works.

The "City Press" of the 26th ult., in a reference to the completion by Dr. WALDO, J.P., of 21 years' service as Coroner for the City of London and Southwark, says that "the position is a unique one, and none has filled it with greater ability and honour than the present occupant." Dr. Waldo is the only Coroner with power, under the local City of London Fire Inquests Act, 1888, to inquire, judically, into the cause, circumstances, and prevention, of fatal and non-fatal fires. By means of this Act, many lives and much valuable property have been saved. Dr. Waldo has investigated many technically difficult electric fires—including the two simultaneous electric cable fires in Oxford Court and Queen Victoria Street Chambers, in the telephone test rooms, and quite recently the fire at the electric power sub-station of the Metropolitan Railway Company, in Moor Lane, City.

Hearty congratulations to Mr. and Mrs. HENRY TOBEY, of Malton, who have just celebrated their golden wedding. Only last month mention was made in the "JOURNAL" of the fact that Mr. Tobey had retired after 47 years' service with the Malton Gas Company—for 45 years as Manager and Secretary, and during the last two years as Secretary. During this long period Mr. Tobey introduced many improvements at the works, to keep pace with continually growing requirements, and also took an active part in the public life of the town, being for about 25 years a member of the Urban District Council. His work, too, was not confined to Malton, inasmuch as he occupied in addition for many years the position of Engineer to the Filey Water and Gas Works. Both Mr. and Mrs. Tobey are well known for their kindly disposition, and with their numerous friends we associate ourselves in wishing for them many more years of happiness. Their family includes Mr. A. B. Tobey (Manager of the Cleethorpes Gas Company), Mr. R. Seymour Tobey (late Engineer and Secretary to the Horley District Gas Company, and now representing the Sutherland Meter Company, Ltd.), and Mr. C. Tobey (who is in Australia).

Immersion Heaters.

In the course of some extensive notes on the heating of water and other liquids, Mr. Thomson King, in the "American Gas Journal," says that of late years the immersion-type heater has been gaining in favour as a means of heating large tanks of water and solutions. In this system, which possesses many advantages for certain kinds of work, gas is caused to burn inside a pipe or other container, which is immersed in the liquid to be heated. The pipe or container is provided with a vent, and the burner with an air blast or with gas at a high enough pressure to draw in all air necessary for complete combustion. The advantages of the method are high efficiency, low first cost, and saving of floor space. It cannot, however, easily be applied to small tanks, while the heating element and vents in the tank take-up room which cannot always be spared. In his notes, he includes the following statement showing the range of efficiency that may reasonably be expected from various methods of heating under normal operating conditions: Open vessel over open burner, as on range, 20 to 35 p.ct.; atmospheric burners under open tank or cauldron, with brick setting or enclosed by a skirting, 30 to 40 p.ct.; small tank heaters, straight flow efficiency, 65 to 80 p.ct.; small tank heaters with tank, efficiency of system based on heat in water delivered at point of use, 50 to 65 per cent.; large automatic storage systems, heater, tank, and circulating pipes properly covered, efficiency of system based on heat in water at point of use, 65 to 80 p.ct.; instantaneous heaters, straight flow efficiency, 75 to 83 p.ct.; instantaneous heaters, efficiency of system based on heat in water delivered at point of use, 55 to 75 p.ct.; indirect system, gas-fired steam-boiler, supplying coil in water tank—heater, tank, and pipes covered, thermostatic control, efficiency of system based on heat delivered in water at point of use, 50 to 60 p.ct.; immersion heaters, 60 to 70 p.ct. What broader or more attractive field, asks the author, invites the application of gas to-day than the heating of liquids?

Manchester District Institution of Gas Engineers.—A two-days' programme has been arranged for the 193rd quarterly meeting of the Institution, which will open, under the presidency of Mr. Harold Davies, at Chesterfield, on Wednesday, Sept. 20, and be continued at Nottingham on the following day. On the first-named day, members will meet at the Chesterfield Gas-Works, and afterwards take lunch with the Directors of the Bryan Donkin Company, Ltd., in the Station Hotel. A formal business meeting of the Institution in the Council Chamber will be followed in the afternoon by a visit to the Bryan Donkin Company's works. Thursday is to be devoted to a visit to the Stanton Iron Works Company's works at Stanton, near Nottingham, to view the Stanton-de Lavaud process for the manufacture of spun cast-iron and concrete pipes. Luncheon will be provided at the works.

Southern Association of Gas Engineers and Managers.—The additional general meeting of the Association will be held at Exeter on Thursday, Sept. 28. The arrangements include the monthly meeting of the Western District at the offices of the Exeter Gas Light and Coke Company, and to which all Eastern District members are invited. Mr. W. N. Westlake has made special arrangements for those who prefer to visit the Guildhall, Cathedral, and St. Nicholas' Priory. Luncheon will be served at the Rougemont Hotel. The general meeting will follow, when, after the election of new members, a general discussion will take place on "The Best Quality of Gas to Declare under the Gas Regulation Act, 1920, having regard to the Interest of the Supplier and the User." The discussion will be opened by Mr. G. M. Gill, M.I.Mech.E., of London. On Friday, there will be a trip over Dartmoor. The motor coaches will proceed *via* Chudleigh and Bovey Tracey to Haytor Rocks, where luncheon will be served at the Moorland Hotel; the return journey being made *via* Widdicombe-in-the-Moor, Two Bridges, Princetown, Postbridge, and Moretonhampstead. By the kind invitation of the Chairman and Directors of Messrs. Willey & Co., Ltd., the works at St. Thomas, Exeter, will be thrown open for inspection by the members of the Association on the afternoon of the 27th inst.

ELECTRICITY SUPPLY MEMORANDA.

REFERENCE was recently made in the "Memoranda" to difficulty at Aldershot over the payments for electricity by tenants of recently constructed houses, in which the good folk conducting business in electricity thought all its "blessings" should be enjoyed, no matter the expense, and no matter how shallow the pockets of the occupiers. Their thoughtfulness does not appear to be highly appreciated by the tenants, whose ideas as to payments for the convenience afforded do not square with the amounts shown on their accounts. Now we read that the Letting Committee of the Swansea Housing Committee are also experiencing trouble with tenants in connection with the agreement made in the matter of electricity supply to houses built under the assisted housing scheme, and in the collection of money due. This is only on account of lighting; and the agreement appears to provide that each tenant should pay 1s. 6d. per week for the service. Some tenants, it is reported, do not use current up to this amount, while others consume it extravagantly, and refuse to pay the amount in excess of 1s. 6d. per week. Some 63 tenants, it is asserted, owe upwards of £53 in respect of light in the quarter ended in June. The matter is to be investigated. A fixed price for consumption of current is, of course, wrong; for there are bound to be householders who will be unreasonable in its use, while others may be exactly the contrary. If there is this fuss with the tenants over bills for lighting only, what would have been the condition with electric radiators, cooking-stoves, and hot-water appliances in operation? Some electrical men with experience of such tenants for lighting only would tremble at the bare thought of the pickle they would have been in. With fixed prices and without individual measurement, one will never persuade people to exercise care in consumption—it is a difficulty even with measurement. Familiarity breeds extravagance.

The New Tenants and Electricity Accounts.

The Westminster Electric Supply Company are making a bid for water-heating business, by, so it is reported, introducing a special low tariff for electric water-heating apparatus of the heat-storage type. No matter whether the apparatus is on the lighting or power circuit, a deduction of 100 units per quarter is to be made from the total consumption registered by the meter on that circuit for each 50 watts of the rated capacity of the heating element of the water-heater. This simplifies matters by the elimination of a special meter and circuit. The number of units so arrived at will be charged at 1d. per unit, provided that the apparatus is used continuously day and night during the whole of the period, and the connections are sealed by the Company. Is this offer quite all that it seems? There are 2190 hours in a quarter, which, multiplied by 50 watts, would mean 109½ units—not 100. Supposing the rated capacity of the heating element is 100 watts, and that the water-heating apparatus is on the lighting circuit, it would mean that 200 units would be charged for at 1d. per unit and 19 units would come into the lighting account at lighting rates. The calculation shows that, allowing 100 p.ct. efficiency (which is the acme of foolishness), and heating the water to 120° Fahr. from cold (say, 48°), each 50 watts rated capacity would only allow for 5·75 gallons of water at that temperature per twenty-four hours. If higher temperatures are required, of course there would be a reduction in quantity, which must be at all times lowered by the heat losses that are inevitable in a water-heating apparatus. The longer such an apparatus has to stand when a quantity of water is required, the heat losses become progressively greater. The "Electrical Times" thinks the tariff offered should prove low enough to secure plenty of business. But there seems to be a little doubt in the mind of our contemporary as to whether the terms will be sufficiently understood. What householders will quickly appreciate is that, by means of a gas-geyser, they are able to obtain as much heated water in as many minutes as it takes hours to secure by the electric heat-storage system; and this at a cheaper rate.

Water Heating on the Storage System.

A "Looker-On" has been writing in the "Electrical Times" on the cost of electric apparatus. He submits that one of the main difficulties in connection with electrical development for domestic purposes is the high initial costs of the appliances. They are much too high to admit of sales to the multitude; and it is the patronage of the multitude and not of the few that makes big business. The writer inquires why it is that the initial costs are high; and, in doing this, he analyzes (so to speak) certain electrical appliances into their components. In the result, though he does not directly and plainly say so, there is no question that in his view the cost of the electrical part of a piece of apparatus is much too high. He takes a copper kettle. At the ironmonger's, he says, one can be purchased for 10s. to 12s. 6d.; but add a heating element, flex, and adaptor, and up springs the price by 18s. or 20s. It is, of course, something more than that. The accommodation of the electric fittings necessitates a difference in the design of, and the work attached to, the making of the kettle. The electric fittings do not fall into place in the kettle without provision. He also instances a washing-machine, which can be obtained for 8 to 10 guineas, with £3 more if a small roller wringer is supplied. A £14 or £15 washing-machine, when electrically equipped, jumps up in price to somewhere in the neighbourhood of 50 guineas. So he goes on, showing by comparison that, compared with a non-electrically equipped piece of apparatus, an electrically equipped one costs more than double as much, which suggests that the electrical fittings are responsible for the greater part of the price. The writer takes good care to say that he does not assume that profiteering is occurring at present selling prices; but if his article means anything, it is that quite enough is being charged for the electrical parts of the apparatus. He attributes the fault to the incapacity to manufacture, distribute, and sell in bulk; but this can never come about while there is not the demand. If we understand the article correctly, increased demand can never develop while initial costs are so high. So the electricians appear to have got into what is practically a *cul de sac* in this respect. Of course, initial cost is not the only thing; the expense of operation, unreliability, and time also come into the reckoning.

Why are Initial Prices High?

"Pot-Boiler's" letter to "Electrical Industries," which has been the subject of reference in the last two issues of the "JOURNAL," has brought one from Mr. R. B. Mitchell, Engineer and Manager of the Glasgow Corporation Electricity Department. He makes the point that Glasgow has installed over 300 electric-cookers, on hiring terms, within the past nine months. If in nine months 300 electric-cookers could not be placed in a city with a population of that of Glasgow, then the Electricity Department ought to be downright ashamed of itself. Novelty of any kind nearly always brings patrons—at first; but it is little use judging of the prospective rate of increase of the business by the initial experience. The really interesting part of Mr. Mitchell's letter is that in which he mentions that there is a co-operative purchase movement on foot, by which it is hoped to purchase cookers in bulk at low prices, and by means of which the small buyer will be able to obtain his requirements at the bottom price. He also states that one or two of the best known makers are to-day quoting a price of £12 for small lots of cookers of an approved hiring type—thus giving the small buyer the full benefit of the reduced mass production costs made possible by the large purchases of undertakings which have gone in seriously for hiring. This statement as to mass production does not square with the complaints that it is such production that is required to bring about lower costs. But the Electrical Engineer of Glasgow, with his 300 cookers, cannot perhaps exactly define what is "mass production." As to £12 for an electric-cooker, though "approved," it does not suggest a cooker for the multitude; and when we ruminate over the difference between £12 and the prices that we have seen quoted for electric-cookers examined at some exhibitions, we wonder whether the price differences mean inferior construction or poor capacity, or how the difference is really arrived at. If it means one or other or both, then it can with confidence be said that the cooker specially made for hiring-out purposes, though "approved" by electrical men, is not likely to be approved by the users. Notwithstanding what has already been said as to mass production, Mr. Mitchell confesses that at present prices the manufacture of electric-cookers is not attractive; and so the objection that the makers expect payment on delivery need not be dealt with. Another admission is that the electric-cooker will always cost more to manufacture than its gas equivalent, even though hired-out in equal numbers.

Co-operative Buying of Cookers.

The Electricity Commissioners in their decisions have a strong leaning towards existing authorized undertakings; and there is no doubt that they are right in this, provided that it can be shown that those who are desirous of erecting independent generating stations cannot by so doing realize a supply as cheaply as from an existing undertaking. No person or company desiring to have a private, independent supply should be penalized, because their custom thrown into the pool will make it better for other consumers. They have a right to freedom, to the cheapest supply, and to the greatest security that they can obtain. The point arises on the application of the South-Eastern and Chatham Railway for consent to the establishment of a generating station at Charlton, in connection with the electrification of their line. Simultaneously, the West Kent Company made an application for consent to the erection of a generating station at Belvedere. By this Company and by the County of London Electricity Supply Company, offers were made to supply the Railway Company. The Commissioners have not yet given a final decision, but they have reported that they are satisfied there are authorized undertakings willing and able to give a supply adequate in quantity and regularity to meet the present and prospective demands of the Railway Company, at a cost not greater than would have to be incurred by the Railway Company. The Commissioners have also taken into account the advantages of combining supply to railways, tramways, and other classes of consumers. In their opinion, the evidence shows that there would be a substantial saving by the adoption of a combined source of supply; and if the Railway Company purchase from such an outside source, they will be relieved from capital outlay to the extent of upwards of a million pounds. The Commissioners, on all

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grounds, consider that it will be no disadvantage to the Railway Company, but a gain to the public interests, if the Railway Company take their supply from an outside source. They suggest that the parties should have a further opportunity of conferring together, in order to arrange a mutually acceptable contract. To enable this to be done, the Commissioners have determined to postpone their decision.

Industry and Power.

It is well known that the power costs in industry represent only a fraction of the total of the works' costs. But, of course, the expense of power cannot be ignored; every economy, in fact, must be achieved in these internationally highly competitive days. It is asserted that countries with water power generating electrical energy will in future have the best of the bargain in industrial competition; but this will depend on the circumstances of the economies that can be effected in other directions. In an article by Mr. R. Gillespie Williams, published by "Electrical Industries," he discusses the relative cost advantages to industry of taking a supply of current from town mains or of privately generating current. His leaning is towards the latter, though he practically admits that no hard-and-fast rule can be applied. The article is interesting, especially to those who do business in supplying gas for private plants. In view of this, he points out that the loss of ½d. per B.H.P. mounts up in the course of a year to upwards of £300 in the case of a firm using 100 B.H.P. per hour. He holds that it is cheaper to generate one's own electricity, provided that the load is large enough, and that the price paid per unit to the supply undertaking is 1½d. or over per unit. Many concerns in provincial areas charge more than 1½d. per unit; and to those firms with a load of 150 KW. or more, it is then cheaper to generate their own electricity. One point that is often overlooked in this connection is that most undertakings have to charge a higher rate for lighting than for power; while the private plant can average its costs over the whole of the electricity generated—for lighting as well as for power. This enables a still better over-all showing for the private plant.

Some Considerations.

It is pointed out by Mr. Williams that whatever price is paid to a supply company, the sum must necessarily cover upkeep and maintenance of distribution cables, losses in transmission, management expenses, and a profit to the company. There is, therefore, scope for improving on the charges of a supply undertaking; for, although it can generate cheaper, the difference in generating costs is not equal to the charge per unit for the foregoing expenses. The average of a year's figures for a company on the south coast, with a maximum load of 1652 KW., is given in pence per unit supplied. It is: Coal and other fuel, 1·61d.; oil, waste, water, stores, 0·09d.; repairs and maintenance, 0·47d.; management expenses, 0·44d.; wages of workmen, 0·39d.; and rent, rates, and taxes, 0·13d.—a total of 3·13d. If 0·37d. profit for the company is added, the total becomes 3·5d. The fuel costs, with a sum of 0·1d. per unit for wages and 0·1d. for maintenance and repairs of the generating plant, come to 1·9d. per unit. Management expenses, together with rent, rates, and taxes, equal 0·57d. per unit. Outside repairs, maintenance and workmen's wages amount to 0·66d. per unit. Together with a sum of 0·34d. the supply company's charge comes to 3½d. per unit. Having regard to these figures, Mr. Williams says a firm in the same district, generating their own electricity, allowing 20 p.ct. extra on fuel costs owing to smaller loads, should save 1·1d. per unit on these charges. Against this has to be set depreciation and loss of interest, which, with a plant of some 200 KW., should not exceed 0·6d.; so that the total saving would be somewhere about ½d. per unit. This is assuming the same system of generating is employed. Had the firm in the example mentioned used semi-Diesel sets instead of steam, the fuel charges would have been under 0·7d. per unit, instead of 2·1d. The author then discusses in detail the results obtained from an installation of three semi-Diesel engines; and in the summing-up he says that a return of 9 p.ct. per annum can be made upon all expenses connected with the plant, when the supply company's charge is 1½d. per unit.

Gas for Making Telephone Apparatus.—Sufficient gas to supply a city of from 80,000 to 100,000 inhabitants is used daily by the Western Electric Company in connection with their manufacturing plant at Chicago. This immense amount of gas is consumed entirely in productive operations requiring exceptionally high temperatures, none of it being used for generating power or for heating buildings. The applications of gas in telephone and radio telephone manufacturing are, says the "American Gas Journal," many and diversified. It heats the large ovens in the foundries, it softens the glass used to make switchboard lamps and vacuum tubes, it heats the lead presses which put the heavy lead coating around miles and miles of telephone cable every day, it softens iron in the annealing ovens and hardens it in the tempering ovens, it heats beakers and crucibles in the chemical laboratory, and it performs a thousand-and-one other tasks in the big works. This Chicago works gas plant is operated twenty-four hours a day in three eight-hour shifts, and is equipped to send out 135,000 c.ft. of gas an hour under peak-load conditions. The usual maximum is about 105,000 c.ft. an hour; and at times the output reaches 1,500,000 c.ft. per day.

FACTORS INFLUENCING THE AMMONIA YIELD IN THE CARBONIZATION OF COAL.

PART I.—THE ROLE OF OXIDATION.

By H. D. GREENWOOD, M.Sc., and H. J. HODSMAN, M.B.E., M.Sc., F.I.C., Department of Coal Gas and Fuel Industries, Leeds University.

[A Paper read before the Yorkshire Section of the Society of Chemical Industry—reproduced from the Society's "Journal."]

INTRODUCTION.

Prior to 1914, the supply of ammonia compounds was dependent mainly upon the industries using fuel in bye-product recovery processes; but the development of the production of synthetic ammonia, with output and selling price largely independent of the circumstances of the fuel industries, has abolished the virtual monopoly of bye-product processes. A new interest is given to methods of increasing the yield of ammonia per ton of coal handled, therefore, whether by increasing the proportion of the nitrogen of the coal liberated as ammonia, or by preserving the ammonia once formed from destruction in, or after leaving, the retort or oven.

The ammonia obtained in normal carbonization practice represents 15 to 20 p.ct. only of the nitrogen of the coal. A similar proportion is obtained as free nitrogen in the gas, and it is important in considering the development of bye-product processes to know how much of this results from destruction of previously formed ammonia. It is, however, possible that a part of this free nitrogen is liberated as such from the coal, and is therefore an inevitable loss.

The first problem is being dealt with by A. C. Monkhouse and J. W. Cobb ("Trans. Inst. Gas Eng.," 1921). The experiments recorded in this paper were initiated to study the conditions of destruction of ammonia by oxidation as distinct from dissociation, because it has been recently suggested that the former is the more important. On account of dissociation, the ammonia in a hot crude gas (even if free from oxygen) from coal is in an unstable condition, and progressively reverting into its elements. A calculation based on the known equilibrium conditions at 800° C. shows that, given time, practically the whole of the ammonia present in crude gas coal could be decomposed at that temperature. This decomposition, however, proceeds slowly enough for a considerable proportion to survive. At a temperature at which the loss in this way may still be small—say, 600° C.—oxidation of ammonia in air may occur at an appreciable rate. A knowledge of the conditions conducing to loss of ammonia in the retort, oven, or producer, by oxidation by indrawn air is clearly important, and, in particular, information as to the part played by water vapour and materials used in the construction of the plant.

While an extensive literature has been compiled dealing with the oxidation of ammonia for the production of nitric acid, this other aspect has received no great amount of study. Data respecting the production of nitric acid from ammonia where conditions are so unlike those found in gas production are of limited application. There is a particular obscurity as to the influence of moisture on the oxidation of ammonia. Although the contrary opinion has been stated, it is regarded as being unimportant in the catalytic formation of oxides of nitrogen (Partington, "The Alkali Industry," p. 229), and moisture is ignored in practice. On the other hand, there is in the carbonization industries a widespread impression that water vapour exerts a definite preservative action on the ammonia in coal gas. This view is frequently held to account for the higher average yields of ammonia obtained in coke-oven practice, where wet slacks with 10 p.ct. or more of water are carbonized. An attempt has been made to give a quantitative evaluation of the effect of moisture, and Foxwell* states that 9 p.ct. of moisture in the slack gives the conditions most favourable to high ammonia yields. Foxwell seems to have in mind several effects traceable to the water, the increase in ammonia formation, retardation in ammonia destruction due to dilution with attendant accelerated flow of the gases, or to some specific action of the water. Of the first influence—increased production of ammonia—there is no doubt, both as a result of experience in practice and the experiments of Monkhouse and Cobb. Respecting the other two, there seems to be less certainty. Summer ("Stahl und Eisen," 1919) has gone further, and drawn definite conclusions as to a distinct preservative influence exerted by water vapour. He also appears to regard oxidation as more important than dissociation in causing losses in ammonia. In his experiments, ammonia in admixture with air, dried or saturated with moisture at 20° C. (about 2·3 p.ct. of moisture), was passed through a heated porcelain tube packed with broken firebrick. The mixture contained 1·5 to 2 p.ct. of ammonia as in carbonization practice. Even at 250° C., under this treatment, the loss of ammonia by oxidation was detected. The presence of moisture did appear to exert a specific preservative action. At 450° C., the effect of moisture was apparently profound. In the dried mixture a loss of 12·89 p.ct. of the ammonia was observed, and one of only 2·01 p.ct. when 2·3 p.ct. of water vapour was present.

In order to account in some way for the results, he postulated

* Foxwell returns to this subject of ammonia losses in carbonization in a recent paper, but does not take oxidation within his purview.

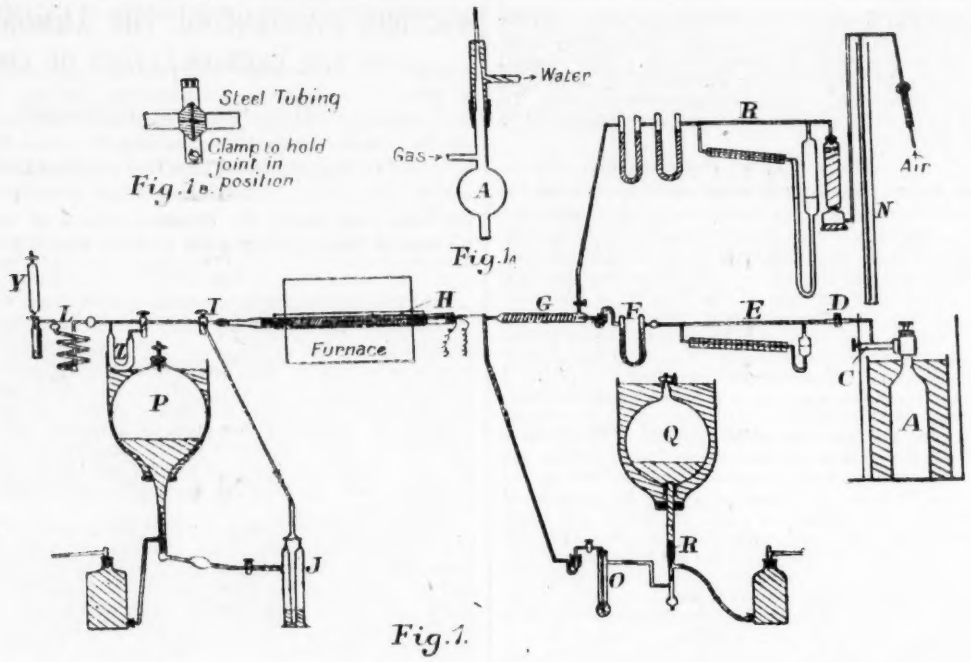


Fig. 1B. Fig. 1A. Fig. 1.

the formation in moist gases of a hydrated ammonia molecule—say, NH_4OH—possessed of increased stability as compared with ammonia at high temperatures. The theoretical interest and practical importance of such results reposing on so slender an experimental basis seem to justify a critical examination. Summer appears to believe that these results are applicable to the carbonization process, though quoting no experiments made in coal-gas mixtures; but from our experience these observations cannot be transferred directly to the very different conditions found in a crude coal gas.

Thau has endeavoured to ascertain the relative importance of oxidation and dissociation of ammonia by experiments on a working coke-oven ("Brennstoff Chemie", 1920). He compared the ammonia content of the gas when the oven was carefully sealed and when oxygen was admitted from a cylinder into the space above the charge, in which case the yield was much reduced. Owing to heat developed here by combustion of the gas with oxygen, the temperature was considerably raised, so that the comparison of dissociation and oxidation was not made under identical temperature conditions. The results, however, do bring out the deleterious action of indrawn air on the yield of bye-products, if the oven temperature exceeds 600°. The conditions in an oven at work are so complex as to make it difficult to associate effect with the cause. Nevertheless, Thau appears to regard oxidation as the main cause of ammonia loss in the oven.

The oxidation of ammonia, as is well known, is very sensitive to the influence of catalysts, both as regards speed of reaction and nature of products, which may be either free nitrogen or oxides of nitrogen. The reactions may be written thus:

(1) $4NH_3 + 3O_2 = 2N_2 + 6H_2O + 237{,}600$ cals.
(2) $4NH_3 + 5O_2 = 4NO + 6H_2O + 215{,}600$ „

Reaction (1) would represent the reaction which might conceivably occur in carbonizing practice; but by the use of suitable catalysts under the proper conditions, a yield of nitric oxide can be obtained almost quantitatively, according to (2), even on a large scale. Neither reaction is reversible under any known conditions. Ammonia appears to be completely unstable in presence of oxygen at all temperatures. This is in agreement with theoretical requirements. Rideal and Taylor ("Catalysis in Theory and Practice," p. 91) calculate, by means of Nernst's heat theorem, the values of the equilibrium constants of the second reaction, if assumed to be reversible. The partial pressures of ammonia which exist at the equilibrium to satisfy the Nernst equation are inconceivably small. The circumstances are similar as regards reaction (1). The decomposition of ammonia by oxidation cannot, then, be regarded as limited by the attainment of any equilibrium or, in accordance with the law of mass action, by the operation of the reaction in the reverse sense. This is important in considering any theories to account for a retarding influence of water vapour.

For a given catalyst and set of conditions, there is an optimum temperature at which the yield of nitric oxide is a maximum. Above and below this temperature the production of free nitrogen increases. At the lower temperatures this is ascribed to the sluggishness of the reaction, unchanged ammonia being left to react with nitric oxide formed thus:

$$4NH_3 + 6NO = 5N_2 + 6H_2O.$$

This alone would suffice to account for the fact that nitrates and nitrites are never observed in gas liquors. Moreover, the time of contact in commercial oxidation of ammonia is very small—say, one-hundredth of a second—whereas in carbonization it is probably several seconds. This is also true of the experiments dealt with in this paper, and it is easy to understand why no large quantity of oxides of nitrogen has been observed in the presence of the most active contact substance employed.

The object of the experiments now recorded was to ascertain the conditions under which oxidation of ammonia would occur, comparable with those current in carbonization and gasification practice. The effect of substances of varying catalytic power was examined, and also what influence (if any) could be traced to the presence of water vapour.

A time of contact was chosen which was believed to be of the same order as that of the gases with the charge in vertical gas-retort practice. In the calculation of this time of contact a number of arbitrary assumptions must be made, for the process by which the gas escapes is complex, and the exact mechanism uncertain. For a given gas delivery in the following experiments the time of contact will depend on the temperature to which the gas is heated. In the calculation, a mean temperature of 600° C. was assumed, and the time of contact in the experiments adjusted to seven seconds, unless otherwise stated.

Experimental.

The apparatus (fig. 1) consisted essentially of an arrangement for producing a constant stream of air, or other gas, and ammonia, and of suitable devices for sampling the mixture, before and after it had traversed the reaction tube.

Method of Producing the Mixture of Air and Ammonia.

The ammonia was obtained from liquefied ammonia gas contained in the small steel cylinder A, fitted with a coarse valve and a fine needle-valve C, for an accurate adjustment of the stream.

The steel capillary from C was connected to the gauge E by a special steel-faced joint D, the construction of which will be understood from the enlarged section (fig. 1B). The ammonia gauge was a modification of an ordinary differential manometer, the one limb being nearly horizontal, and the other enlarged into a bulb. In this way a magnified reading could be obtained.

The ammonia, dried by the soda-lime tube F, passed *via* a mercury-sealed joint into the mixing tube G, consisting of a glass tube 20 cm. long and 2 cm. in diameter, loosely packed with glass wool. The air (or other gas) was drawn from a steel cylinder charged at 50 atmospheres pressure.

In order to maintain a constant rate of flow, the excess air was allowed to bubble continuously through the water seal N. The air passed through a tower containing pumice and sulphuric acid, and then *via* the gauge R, for measuring the rate of flow to the final drying tubes containing the calcium chloride and phosphorus pentoxide. The air gauge was similar in construction to the one previously described, with the exception that the ammonia gauge was filled with paraffin oil, whereas for the air gauge concentrated sulphuric acid was used.

After leaving the mixing tube, the gas mixture could be diverted through the absorption tube O. The ammonia is here absorbed by *N/10* sulphuric acid, the remaining gas passing forward to the gasholder Q, of capacity about 700 c.c. The gas enters the holder through the capillary R, whereby a pulsating flow is avoided. The narrow tube at the base of the holder (fig. 1A) is calibrated so that the gas volume can be read off to within 0·2 c.c.

When the mixture was not being sampled as above, the gases passed directly through the reaction tube H, then through a second absorption vessel J, where any unoxidized ammonia was absorbed, the residue being collected in the gasholder P. This

was similar to the one previously described, though of capacity 1700 c.c.

Alternatively, the mixture could be passed through the Winkler worm L, containing dilute caustic soda solution to absorb oxides of nitrogen, followed by a guard-tube containing a solution of diphenylamine in concentrated sulphuric acid, to indicate incomplete absorption. The gases then finally left the apparatus through the detachable sampling tube Y. When desired, the oxidation products could be bye-passed through the soda-lime tube Z, to determine the amount of water formed in the reaction.

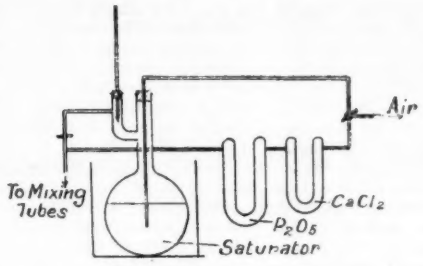


Fig. 2.

In order to compare the oxidation with dry and moist gases under identical conditions, a three-way tap was later inserted after the air gauge (fig. 2). The air (or other gas) could then be passed either through the drying system as above or else through a Claisen flask, where the gas was saturated with moisture at a known temperature. To prevent condensation of moisture, the succeeding portions of the apparatus were maintained above this temperature by suitable heating devices.

The reaction tube was made from hard glass tubing, and connected to the three-way cock I by a sleeve joint, the packing consisting of a mixture of finely powdered silica and water-glass. The other end of the reaction tube was closed by a rubber stopper, through which were inserted the tube conveying the gas mixture, and also the thermocouple sheath. The junction of the thermocouple could thus be placed within the contact mass, enabling the temperature of the latter to be measured and kept constant within $\pm 5^\circ$ C. The reaction tube was heated in an electric furnace wound so that the zone occupied by the contact mass was uniformly heated.

The tube was normally packed over a length of 6 in. with the material on which experiments were to be made, the volume of the material being such that the time of contact of the gases in this zone was approximately the same with each type of material. Uniformity of flow of the ammonia was maintained by keeping constant the temperature of the cylinder A, and therefore the vapour pressure of contained ammonia. The cylinder was placed in a bath of water, and the whole surrounded by a cardboard box, the intervening space being loosely packed with cotton wool. The back-pressure thrown by the various absorption systems was so regulated that the rate of flow was unchanged when the gases were passed through any one of these systems.

Method of Experiment.

The streams of air and ammonia having been regulated to give the desired percentage of ammonia, the mixture was passed through the apparatus for about three-quarters of an hour. The gases were then passed directly into the holder Q. When this was full the stream was diverted through the reaction tube, and again collected, on leaving, in the holder P. When this was filled, the stream was again diverted into the smaller holder Q. Thus the initial percentage of ammonia in the gases could be determined at the beginning and end of an experiment. The acid in the absorption tube O was titrated directly with standard alkali; but the ammonia in the second tube J was determined by distillation in the usual manner, since the presence of oxides of nitrogen in the oxidation products would vitiate the results of a direct titration.

The traces of oxides of nitrogen were estimated by matching the colour obtained with phenylenediamine hydrochloride against a standard nitrite solution.

Oxidation in Contact with Fused Silica.

In order to obtain some idea of the range of temperature over which oxidation takes place when catalytic influences are minimized, the reaction tube was packed with fragments of fused silica taken as an example of a relatively inactive contact material. In the initial experiments, these fragments filled the whole tube, but in all the succeeding work only the central uniformly heated zone as already stated was filled, and the rest of the tube was occupied by cylindrical distance pieces of fused silica.

The time of contact of the gases was materially greater in the initial experiments, and hence a greater oxidation was found (Table I.). Below 500° C. small quantities of nitrous acid were detected in the absorption apparatus, but never nitric acid. Above this temperature the ammonia oxidized was all converted into free nitrogen. The absence of nitric acid is presumably due to the small velocity of the reaction $2NO + O_2 = 2NO_2$. Using the figures given by Lunge and Berl, ("Z. angew. Chem." 1907), we find, assuming that 3 p.ct. of the ammonia is converted into nitric oxide, that the minimum time necessary for its further oxidation to nitrogen peroxide, would be about two minutes at 20° C., whereas the time available in these experiments was not greater than five seconds.

A series of experiments was also carried out with nitrogen containing about 1 to 2 p.ct. of oxygen, instead of the air, without altering the packing in the reaction tube. The results given in Table II. and fig. 3 show that the oxidation of ammonia is retarded by a decrease in the concentration of the oxygen; but the influence of this factor becomes less pronounced at higher temperatures. The absence of oxides of nitrogen from the reaction products is in agreement with theory. Their formation in the absence of an active catalyst is slow, and decomposition follows by reaction with the excess of unchanged ammonia.

(*To be continued.*)

TABLE II.

Temp. °C.	Rate of Flow, Litres per hour.	P.Ct. NH_3 Entering.	P.Ct. NH_3 Leaving.	P.Ct. NH_3 Oxidized.	P.Ct. O_2 Entering.	P.Ct. O_2 Leaving.
595	4·10	1·602	1·570	2·4	1·85	1·86
615	4·10	1·505	1·432	4·7	1·97	1·95
710	4·09	1·762	1·474	16·3	Not estimated.	
770	4·01	1·500	0·935	35 0	1·89	1·30

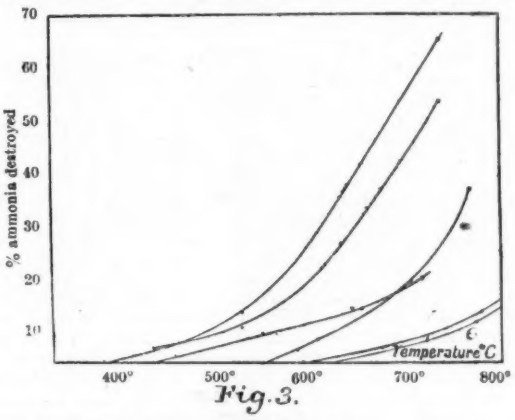


Fig. 3.

1. In dry air in contact with fireclay.
2. In moist air in contact with fireclay.
3. In dry air in contact with silica.
4. In N_2 + 1-2 p.ct. O_2 in contact with silica.
5. In coal gas + 1-2 p.ct. O_2 in contact with firebrick.
6. In coal gas + 1-2 p.ct. O_2 in contact with silica.

TABLE I.

—	Temperature °C.	Rate of Flow, Litres per Hour.	P.Ct. NH_3 Entering.	P.Ct. NH_3 Leaving.	P.Ct. NH_3 Oxidized.	Water Formed by the Oxidation per Hour. Found.	Water Formed by the Oxidation per Hour. Calculated.	P.Ct. O_2 in Gases Leaving Furnace.	P.Ct. O_2 in Gases Leaving. Calculated on NH_3 Oxidized.	Remarks.
Reaction tube packed entirely with silica chips.	460	3·94	2·044	1·981	3·1	0·0015	0 0011	20·71	20·76	Trace of HNO_2, no trace of HNO_3
	510	3·97	2·000	1·863	6·5	0·0056	0·0063	20 70	20·71	15 p.ct. of oxidized NH_3 present as HNO_2
	550	3·98	2·030	1·830	9·5	0·0081	0·0084	20·70	20·66	No HNO_2 or HNO_3 could be detected
	670	3 90	1·800	1·224	31 0	0·0140	0·0135	20·30	20 35	Ditto
	750	3·97	1·790	0·885	51·0	0·049	0·0477	Not estimated	Not estimated	Ditto
Tube only packed over 6 in. with silica chips.	400	3·79	2·008	2·000	*Nil*	Not estimated	Not estimated	,,	,,	Gases sat. 23° C. Moisture = 2·8 p.ct.
	560	3·800	1·790	1·680	6·1	0·0050	0·0065	,,	,,	Dry gases
	560	3·89	1·951	1·826	6·4	Not estimated	Not estimated	,,	,,	Gases sat. 23° C. Moisture = 2·8 p.ct.
	660	3·78	1·879	1·705	9·2	,,	,,	,,	,,	Gases sat. 23° C.
	720	3·78	1·827	1·512	17·2	0·140	0·0120	,,	,,	Dry gases
	720	3·90	1·924	1·645	14·5	Not estimated	Not estimated	,,	,,	Gases sat. 23° C.

EFFECT OF B.TH.U. ON BURNER EFFICIENCY.

Reductions in heating value standards in many American cities from the comparatively high levels previously in force, are claimed to have brought about material savings in the cost of manufacture of gas and lower expense to the consumer than if the former standards had been continued. At the same time, the reductions in standards have not always been brought about without some complaint from the consumers that the service was inferior and the total cost greater than with a gas of higher heating value. Therefore, with a view to determining the most economic and satisfactory calorific standard for Baltimore, the Public Service Commission of Maryland have been fully investigating the matter; and in connection with the inquiry, they asked the Bureau of Standards to carry out laboratory tests for the purpose of determining the relative efficiency of gases of different heating value, and the adaptability of existing appliances for gases differing in heating value and composition.

In a Bureau report, Messrs. Berry, Brumbaugh, Eiseman, Moulton, and Shawn give the results of tests which show the relative efficiency of utilization of gases of different heating values and composition. The Consolidated Company's gas employed contained approximately one-third coke-oven gas and two-thirds water gas, the calorific value being about 500 B.Th.U. Coke-oven gas used in the tests had a value of 450 B.Th.U.; and coal gas secured from the Philadelphia Gas-Works was of a value of 525 B.Th.U. As regards the water gas employed, different heating values were obtained by varying the quantity of oil sprayed into the carburettor. Three burners were used—No. 1, a star burner, selected because it is the one most extensively employed in Baltimore; No. 2, a disc burner, selected because it was desired to test one of an old design many of which are still in service in Baltimore; and No. 3, a later design of the disc type much used in New York. Every effort was made, in a series of efficiency tests of gases of ten different heating values, to make the condition of test as practicable as possible. Two ranges were used, and the burners were adjusted in the way that a practical gas-fitter would apply on a consumer's premises. The initial adjustment of the burners for each kind of gas was made for 3 in. pressure. After the careful initial adjustment, no other changes were made in the gas orifice or air shutter when the burner was operated at other pressures.

In plotting out the values of efficiency obtained with the various calorific values, the corresponding rates of consumption in cubic feet per hour, and the time required to heat two quarts of water to boiling from 80° Fahr., it is remarked that the tests proved conclusively that when the standard burner of the star type was placed $1\frac{3}{16}$ in. from the utensil, it consumed gas at the rate of 9000 B.Th.U. per hour. All the different gases, irrespective of the kind of gas or B.Th.U. content per c.ft., gave a constant efficiency of about 37 p.ct., at least within the range of heating values used in the tests (300 to 600 B.Th.U.). The time required to heat two quarts of water to boiling from 80° Fahr. with 9000 B.Th.U. per hour was about ten minutes. At the rate of 7000 B.Th.U. per hour an average efficiency of about 36 p.ct. was obtained, and some thirteen minutes were required to heat two quarts of water to boiling from 80° Fahr. For a rate of 11,000 B.Th.U. per hour, the average efficiency was about 37·7 p.ct., and the time required to heat two quarts of water to boiling from 80° Fahr. was eight minutes.

It is remarked in the report that within the range of gas consumption normally used in hotplate burner cooking, there will be some variations in the efficiency with the rate of heating; and so for an exact comparison of the efficiencies of gases of different heating values, the burners must be supplied with the same total quantity of heat units per hour. It is the opinion of the writers that a good average adjustment on a standard burner will represent a consumption of about 9000 B.Th.U. per hour. An adjustment for this rate will allow a variation in gas pressure which will be within the usual legal requirements without causing poor service or loss in efficiency.

Anthracite.—We recently received from Sir Isaac Pitman & Sons, Ltd., a small volume on "Anthracite and the Anthracite Industry" by Mr. A. Leonard Summers. The published price is 3s. net.

Coke-Oven Managers' Association (Midland Section).—The Midland Section of the Coke-Oven Managers' Association had an excursion meeting last Saturday week at the coke-oven and bye-product works of the Staveley Coal and Iron Company, Ltd., Barrow Hill, near Chesterfield. The party were received and conducted round the works by Mr. C. E. Whitehead (the General Manager of the Devonshire works), Mr. S. M. Martin (the Manager of the coke-ovens and chemical plant), Mr. A. R. Scott (the Chief Chemist), and the Engineer of the Simplex Company. The works have recently been considerably enlarged, and are still undergoing extension—a new installation of 100 Simplex coke-ovens having just been completed. The additions will bring the total coke-oven plant up to 250 ovens in a straight line. After the tour, the members were entertained by the Staveley Company, and Mr. C. P. Finn expressed the thanks of the visitors for the way in which they had been received.

STRUCTURE OF COAL SEAMS.

IN a paper which he read last June before the Manchester Geological and Mining Society, Mr. F. S. SINNATT, M.B.E., M.Sc. (Tech.), F.I.C., described a method of representing the structure of coal seams, and the proportion and properties of the four constituents (vitrain, clarain, durain. and fusain) contained in certain seams. The paper (which will later be supplemented by a second communication) has been reprinted in pamphlet form from the "Transactions" of the Institution of Mining Engineers, and published by them at No. 225, City Road, E.C.

The author points out that the observations made by Dr. Marie Stopes—that banded bituminous coal-seams contain, as a rule, four main ingredients or constituents—provide a means of attacking the problem of the properties of coal which is of the greatest importance. The four ingredients—vitrain, clarain, durain, and fusain—may be readily identified without the necessity of a microscopical examination, though the latter is of value as a method of deciding absolutely the nature of a particular part of a seam. He gives a brief description of the appearance of the four ingredients, which agrees substantially with that furnished by Dr. Stopes, and adds that, unless experimenters conform to the descriptions of Dr. Stopes, wide divergences may be expected in the method of designating seams referred to in the paper. Dr. R. Lessing, in two extensive papers,* showed that the four ingredients of coal possessed distinctive caking properties, and that the inorganic constituents present were characteristic.

Mr. Sinnatt gives an account of the results obtained when the vitrain, clarain, durain, and fusain in a number of seams are accurately measured, and the values drawn out diagrammatically. The method of measuring the seams consisted in drawing a vertical line on the face of the coal from the roof to the floor, and dividing the seam into three or four sections. The layers of the four ingredients were then measured accurately. Direct-reading steel callipers were employed in order to facilitate the work. Little difficulty was experienced in identifying the ingredients, especially where both the face and the end of the coal could be examined. In the pits, sufficient illumination was obtained from two electric lamps. A second worker was required to keep a record of the measurements. When the total amount of each of the four ingredients in the seam has been ascertained by measurement, the percentage of each is calculated.

The author says it appears reasonable to suggest that the method outlined by him will provide an auxiliary means of recording changes in seams, and may be of value in their correlation. It is obvious that a number of measurements will be required in order to obtain an average composition for the seam over a certain area. Objections to the method may be made on the grounds of expense; but he points out that one section of the Arley Mine was measured, drawn out, and the composition calculated in under six hours.

From an approximate analysis of the ingredients from four seams, Mr. Sinnatt states that the following broad general observations are permissible:

Vitrain contains the highest percentage of moisture and the lowest percentage of ash.

Clarain evolves the highest percentage of volatile matter less moisture, and contains only a slightly higher percentage of ash than vitrain. The amount of ash lies between vitrain and durain.

Durain contains the lowest percentage of moisture and the greatest amount of ash. The volatile matter evolved is less than either vitrain or clarain.

Fusain contains a high percentage of ash, and a considerably lower percentage of volatile matter.

The chemical analyses of the four constituents from the same seam show very marked variations.

If the chemical analyses can be taken as a criterion of the properties of coal, the two main ingredients—clarain and durain—would be in separate classes, and would find applications of a distinct nature.

The vitrain, clarain, durain, and fusain not only differ in proximate chemical analyses, but possess characteristic coking properties. Dr. Lessing has shown that, broadly speaking, durain possesses small caking properties, while vitrain and clarain comparatively are highly coking. Mr. M. Barash, M.Sc. (Tech.), has carried out a number of determinations of the agglutinating values of the ingredients for the author, using electrode carbon (I.M.M. 60-90 mesh) under conditions which were absolutely uniform. The table below shows the results of the determinations:

Agglutinating Values of the Four Constituents.

—	Coal.	Vitrain.	Clarain.	Durain.	Fusain.
Arley Coal	15	9	17	6	*Nil*
Wigan Five-Feet	4	3	7	5	*Nil*

Clarain possesses the highest agglutinating value, considerably greater than vitrain or durain, while, contrary to the observation made by Lessing on the Thick Seam at Hampstead Colliery, the durain possesses marked caking properties, and in the case of the Wigan Five Feet Seam the agglutinating power of the durain is higher than that of the vitrain. It is clear that, where a certain

* See "JOURNAL," Vol. CXLIX., p. 188.

ingredient possesses a high agglutinating value, the property may be of especial importance in the light of progress which may be made in the low-temperature carbonization of coal.

Further work is necessary in order to ascertain the influence of a proportion of relatively non-caking durain or vitrain upon the caking properties of clarain. It is now known that fusain modifies the caking properties of coal in which it occurs. In order to take full advantage of the caking properties of the different ingredients, it is clear that with certain seams the coal not only requires to be pulverized, but also the ingredients must be intimately mixed, so that the highly caking ingredient is disseminated evenly throughout the material.

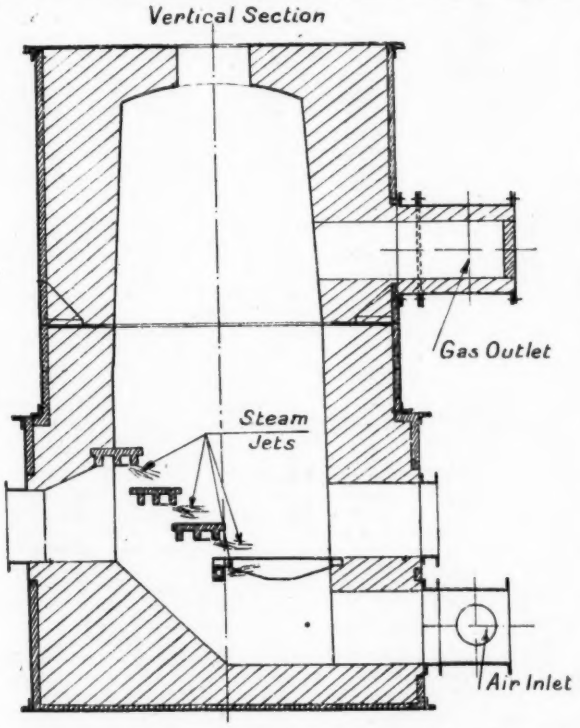
The present results suggest that the properties of coal can best be ascertained by (*a*) obtaining an accurate knowledge of the percentage of the four constituents contained in the seam, (*b*) making a study of the properties of the four constituents, and (*c*) computing the properties of the whole seam from knowledge thus acquired.

AUTOMATICALLY CONTROLLED WATER-GAS PRODUCTION.

By G. VIGREUX.

[From a Paper read at the Annual Meeting of the Société Technique du Gaz.]

The feature of the water-gas apparatus invented and described by M. Vigreux is that the blow and gas-making periods are equal, which allows of the joint working of two units for a continuous production of gas, and of economy in the size of the container required. The reversing movements of the valves are effected automatically by steam, hydraulic, or compressed-air pistons. The air and steam deliveries are regulated by means of indicators and manometers. The sensitive heat and the combustion heat of the blow gases are both brought into the scheme of heat economy. It was found to be essential to the scheme to have certain quantities of heat stored in the generator (as constant as possible, to avoid too many corrections to the automatic control) in order not to have to increase the blow or vary the steam delivery for any one



period or successive periods. This is achieved by the special construction of the generator. The wide square base is surmounted by a truncated conical section which facilitates the descent of the fuel, and the angles formed by the junction of the base and the conical top deflect downwards by radiation part of the heat. As can be seen from the diagram, the gas outlet is some distance below the top of the apparatus, and the gas in passage yields part of its heat to the reserve of coke above the outlet, which has not yet reached the gasification zone. The steam, produced in the plant itself, is superheated at the bottom of the apparatus, and distributed by small holes; points of contact with the hot coke being made as numerous as possible, so as to permit of the complete decomposition of the steam at the base, where temperatures are highest at the time of the blow. The boiler, heated by the blow gases, maintains an equilibrium with the producer, as regards the quantity of steam required. The more heat given up by the gases, the greater the pressure of steam entering the apparatus. This ensures much greater regularity of production than leaving to the man in charge the regulation of the valves as he thinks fit.

Tests of the gas produced were taken by the Faculté des Sciences de Lille, over a four hours' run, during which there was no interference with the automatic working. The results were:

H_2	43·6	45·1	42·2	44·5
CO	32·8	32·4	34·8	34·8
CO_2	3·4	1·2	1·7	2·0
O_2	0·6	0·8	0·9	1·0
Calorific value	285	289	287	294

Fuel used, unscreened gas coke.

No information is available as yet with regard to the decomposition of carburetting oils or tars in the water-gas apparatus described. If it is found desirable to reduce the percentage of carbon monoxide in the gas made, the author suggests an admixture of iron clippings with the coke. Heated to incandescence, the iron will be decomposed in the presence of steam, with simultaneous production of hydrogen, thus reducing the percentage of carbon monoxide.

The paper concludes with a theoretical discussion of the heat-unit balance-sheet of water-gas production. It is claimed for the Vigreux process that the system of recuperation is completed by using the waste heat for steam production, as well as its superheating, and for pre-heating the air before admission to the producer. It therefore enables large quantities of water gas or hydrogenated gas to be produced under conditions of the best efficiency, and with a minimum of manual labour. One man can supervise the continuous production given by two sets.

Use of Carbon Black in Rubber.

According to a memorandum by the United States Bureau of Mines, prior to 1914 carbon black was used by the rubber industry in small amounts for colouring; but little distinction was made between carbon black and lampblack, the two being employed practically indiscriminately. At the present time, however, partly on account of the stimulus afforded by the rising price of zinc oxide, carbon black is used in large quantities as a filler for rubber, with a correspondingly decreased amount of zinc oxide. Many of those connected with the industry claim unusual properties for rubber so compounded. Carbon black is used in quantities of from 3 to 20 p.ct. by weight, and is said to increase greatly the tensile strength of the rubber, and to afford extra toughness and resistance to abrasion. Some authorities even believe that the life of the rubber and its capacity to carry loads are increased. On the other hand, there are rubber chemists who are more conservative, and who do not admit that carbon black possesses any qualities that render it irreplaceable. Theoretically, carbon black should be an ideal filler for rubber, owing to its extremely fine state of division, and to the correspondingly large surface energy developed by mixing intimately with the gum rubber. It also serves to protect the rubber substance from the effects of light, and it may retard oxidation. But, add the Bureau, whatever the exact facts may be as to the irreplaceability of carbon black in rubber, a large amount is now consumed by the rubber companies for automobile tyres and other articles—probably 20 million pounds annually, besides 10 million pounds exported in normal times.

American Coal Situation.

Some suggestions for remedying the coal situation in the United States have been put forward by Mr. George O. Smith, Director of the Geological Survey at Washington, who says that what coal producers and coal consumers alike need is reform of the business, rather than compromise between parties to the controversy; and in this reform it is absolutely essential that the mine worker should co-operate with the mine operator. Too long have the owners treated the coal business as a private privilege, and too long have the labour leaders, with no less monopolistic attitude, obstructed every move for underground efficiency and economy. Cheaper coal and larger earnings will come when engineering is emphasized more and bargaining less. The national problem just now is the betterment of the working time of coal mines—and especially bituminous coal mines. For the whole country, 215 days is the average year; but the lack of efficiency and the losses due to irregular operation are not universal, for many individual mines operate 300 days in the year. The large consumer can do much to smooth-out the irregularities of mine operation by making long-term contracts—even five years—and providing for delivery to suit the mine as well as himself. Such contracts could be made at lowest prices; for with long-term contracts in hand, the mine operator could reduce his costs to a minimum. With such a steady market, full-year operation and steady employment would become possible. A longer working year for a reduced force is the only possible method of bringing about the lower wage scale and the larger annual earnings, both of which are generally needed. The general welfare is tied-up with a regular supply of lower-cost coal and larger earnings for those who produce it; and the responsibility for mending the broken year needs to be shared by the many who can help thus to bring about the economic and social benefits arising from coal that the nation's industry can afford to buy.

Among wills recently proved was that of Mr. Thomas Duxbury, of Deansgate, Manchester, gas engineer and coal merchant —£37,728 gross.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Therms.

SIR,—What a pity it is that apparently there is no one in authority in the London Gas Companies who is capable of putting an unconfused explanation of the therm before the general public! I am a shareholder in several gas companies, and quite understand the therm; but after reading the South Metropolitan Company's statement in the Press this week, I am not surprised that the public are confused.

We are told that "a therm is 100,000 B.Th.U., and that one such unit will raise 1 *pound* of water 1 degree in temperature." Quite so; but now comes the confusion, for the statement proceeds—"a therm *therefore* will raise 1000 *gallons* of water 10 degrees." The South Metropolitan Company are thus setting the public the following problem; and with only the above data to work at, I defy even Dr. Carpenter to arrive at an answer: If it takes 1 B.Th.U. to raise 1 *lb.* of water 1°, how many will it take to raise 1000 *gallons* 10°? Could anything be more confusing? It is equivalent to saying to a housewife—"If it takes 10,000 B.Th.U. to bake a leg of mutton, how many therms will it take to bake a rabbit pie?"

I remember, too, when the Press agitation was first started, a responsible head of one of the London Gas Companies gave it much impetus by making the totally uncalled-for and ill-advised statement that many companies were "charging too much for the therm," thus giving the public the impression that the Press was justified.

Surely the different companies should sink such little differences of opinion, and show a united front to the common enemy!

No. 72, Abbeville Road, S.W. JOSEPH A. GUTTRIDGE.

REGISTER OF PATENTS.

Gas-Burners.—No. 183,977.

STIMEX GAS-STOVE COMPANY, LTD., and SAYNER, G. S., both of Balham Hill, S.W. 17.

No. 15,340; June 2, 1921.

This invention relates to longitudinal atmospheric gas-burners of the kind in which the mixture issues from a longitudinal slit, the width of which is varied by the lateral position of a longitudinal bar. The object is to enable the width of the slit to be adjusted by a longitudinally applied displacing effort exerted on the adjusting bar, thus rendering it particularly adapted for ordinary domestic cookers; the displacing effort, for instance, being applied by a single screw or nut.

For this purpose, the parallel guide slotways in the adjusting bar, instead of being directly transverse thereto, are oblique, whereby a longitudinal thrust or pull exerted on the end of the bar results in oblique displacement thereof. The slot and the adjusting bar may both be duplicated to give a duplex longitudinal jet, which may merge as a single flame; the two bars being worked in unison by a single screw and moving obliquely in laterally opposite directions towards or away from a longitudinal cover-plate interposed between them.

Geysers.—No. 184,018.

EWART, J. W., of Euston Road, N.W.

No. 18,212; July 5, 1921.

The object of this invention is to provide improved interacting safety means for the gas and water supplies to a geyser. The patentee arranges opposing stops on the movable part of the controlling tap of the gas supply pipe and on the burner, which stops prevent the tap being turned on so long as the burner is in position within the geyser, but which, when the burner is moved to the exterior of the geyser, no longer oppose one another, so that the tap can be turned on. One of the stops is so constructed that it will yield to allow the other stop to assume the opposing position when the tap is turned off with the burner in position within the geyser. A stop is provided on the movable part of the gas tap and a co-acting stop, operable by means of an eccentric, on the movable part of the water tap so as to prevent the gas tap from being turned on until the water tap is turned on, and the water tap from being turned off while the gas tap is in the turned-on position.

Measuring Calorific Value.—No. 184,025.

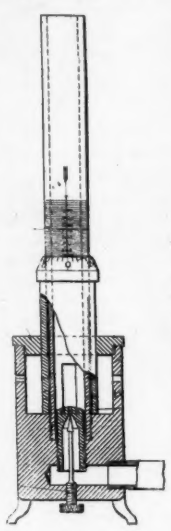
WITHERS, J. S., of Chancery Lane, W.C. 2. (A communication from E. R. Lanphier, of Toronto.)

No. 18 379; July 6, 1921.

The object of this invention is to provide a method and apparatus whereby the calorific value of a gas may be determined with relation to the calorific value of a gas of known quality. A further object is to provide apparatus by which the value of the tested gas may be read directly in terms of any accepted standard thermal units. It is based upon, and utilizes, the known fact that the bright-blue flame of illuminating gas burned in a bunsen burner indicates practically complete combustion resulting from an adequate supply of oxygen from the air, and that when the air supply in the mixing chamber is insufficient, a yellow tip will appear in the inner cone of the flame and will indicate incomplete combustion.

In carrying out the invention, a gas of known calorific value (hereinafter referred to as the laboratory gas) is introduced to a bunsen burner, is ignited, and then the burner is adjusted so that the yellow tip in the inner cone of the flame will just disappear; the parts of the burner which are provided with graduations indicating standard thermal units having been previously set to correspond to the laboratory gas. The supply of laboratory gas is then shut off, and the gas to be tested (hereinafter referred to as the commercial gas) is introduced to the burner, and the graduated portion of the burner is adjusted until the luminous tip disappears. The reading of the graduations on the burner will then indicate the calorific value of the gas being tested.

The construction of a suitable burner, according to the invention, is clear from the accompanying part-sectional elevation. It may be pointed out, however, that the air-inlet is by way of the elongated aperture shown; the air having been first induced through a series of holes surrounding the annular chamber comprising part of the burner body. The plug which co-operates with the needle gas-valve is mortiсed on its conical top, so as to accommodate a key for purposes of fine adjustment. The threads between the tube and the sleeve are preferably forty to the inch; and the upper end of the sleeve is provided with a micrometer screw divided into twenty-five, so that one graduation will represent a movement of one-thousandth of an inch in the sleeve. Each complete revolution will measure 25 B.Th.U., and one graduation of the micrometer screw will represent 1 B.Th.U.



In carrying out the method by means of the apparatus above described, the burner is first adjusted approximately to burn completely a gas of known calorific value. To this end, the sleeve is screwed upwardly until the upper end registers with the graduation indicating the calorific value of the laboratory gas, and then the plug is screwed upwardly in the base to reduce the elongated opening to a size which, as nearly as can be determined in advance, is adapted to supply the right quantity of air for perfect combustion of the laboratory gas. The gas is then introduced and ignited at the upper end of the tube. If a yellow tip appears in the inner flame-cone, the needle valve is first regulated to adjust the supply of gas. When this reduces the supply of gas too much before the luminous tip disappears, the plug must be screwed downwardly to admit more air. If, on the other hand, the yellow tip does not show in the inner cone, the gas supply is increased by opening the needle valve until a faint yellow tip shows in the inner flame cone; if, however, this adjustment interferes with the full flame body, which should be about 4 in. in height, the plug is screwed upwardly until the yellow tip appears in the inner flame cone, and is then just eliminated by the method described. When the parts have been properly adjusted and the yellow tip has been just eliminated from the flame, the instrument will be ready to test the commercial gas. To do this, the commercial gas is introduced and ignited. The sleeve is then screwed upwardly or downwardly, as required, until the luminous tip in the flame is just eliminated; and the reading of the instrument as before described will give the value of the commercial gas in terms of the thermal units indicated on the scales—in B.Th.U., in the form illustrated.

For illustration only, let it be assumed that the value of the standard gas has been found to be 500 B.Th.U., and that the instrument has been adjusted and set accordingly, and that in testing the commercial gas the yellow tip is visible in the inner cone of the flame, thus indicating that the calorific value of the commercial gas is greater than the calorific value of the laboratory or standard gas; and that to eliminate the yellow tip, the sleeve has made two and one-fifth counter-clockwise rotations, then the reading will be: 500 B.Th.U. + 55 B.Th.U. = 555 B Th.U.—the true value of the gas as compared with the standard.

Reversely, if upon igniting the commercial gas the yellow tip is not visible in the inner cone of the flame, it will indicate that the calorific value of the commercial gas is below the calorific value of the laboratory gas. It will then be necessary first to reduce the supply of air to such extent that the yellow tip will appear in the inner cone of the flame, and then gradually increase the supply of air just enough to eliminate the yellow tip. Then assuming that on the scale the reading is 450 units and on the micrometer the reading is 5 units, then the calorific value of the tested gas would be 500 B.Th.U. – 55 B.Th.U. = 445 B.Th.U.

The inventor found by experiment that the length of bunsen tube most suitable for a device of the preferred form is at least twelve times the diameter of the tube, because the gas and air traversing the unusual length of the tube become thoroughly diffused and mixed, and consequently produce a more even and constant flame than could be produced by a tube in which the ratio of length to diameter is less. It has also been found by experiment that a minute gas orifice as compared with the area of the bore of the bunsen tube—in practice about 1 to 60—is best adapted to check the velocity of the air and gas mixture beyond the point of air admission, and is also best adapted for use with a bunsen tube of a length not less than twelve times the diameter of its bore.

Thermostats.—No. 184,055.

STIMSON, E. F., of Tooting Bec Common, S.W. 17, and STIMEX GAS-STOVE COMPANY, LTD, of Balham Hill, S.W. 17.

No. 20,657; Aug. 3, 1921.

This invention relates to thermostats for regulating the flow of gas to the burners of gas-heated hot-water circulators and the like. Such usually consists of a sealed capsule, containing a liquid, closed at one end by a plug having a spigot immersed in the heated water and conveying heat therefrom to the liquid in the capsule. The other end of the capsule has a flexible diaphragm bearing against one end of a

lever, the other end of which bears against a spring-opened valve in a passage through which the gas flows to the burner. The capsule, lever, and valve are located in a closed chamber to which the gas has access. A screw adjusts the position of the fulcrum of the lever, so determining the temperature at which the thermostat becomes operative. In a certain thermostat the head of this screw is external to the casing, and the point of the screw bears upon the bearing of the fulcrum of the lever sliding plunger-like in a boss of the casing.

The object of the present invention is to facilitate regulation of such a thermostat by the consumer so as to set the device to become operative at a given temperature within a predetermined range. For this purpose, the screw whereby the fulcrum of the lever is adjusted towards the capsule and valve or allowed to recede therefrom under the influence of the valve spring, is furnished with an external pointer and finger-operated head, such as a milled head. Such pointer and screw acting on the fulcrum should be distinguished, say the patentees, from the previous proposal wherein a pointer-provided screw adjusted the strain of the valve-spring.

Water Heaters.—No. 184,056.

STIMSON, E. F., of Tooting Bec Common, S.W. 17.

No. 20,658; Aug. 3, 1921.

This invention relates to water heaters heated by gas or the like, and its object is to provide one capable of withstanding the pressure of a considerable head of water, easy to clean, light in weight, convenient and cheap to manufacture, yet efficient in operation.

Such a heater is shown, it is claimed, in the accompanying drawings, of which fig. 1 is an end elevation, half in transverse section, and fig. 2 is a longitudinal sectional elevation.

A is an oval or flattened cylindrical boiler arranged with its axis almost horizontal, tilting downwards slightly towards the right-hand end of fig. 2. This is surrounded by a cylindrical feed-water heater jacket B, spaced apart from the boiler sufficiently to accommodate beneath the latter a gas-burner C, and to provide a flue space around the flanks of and above the boiler. Near the bottom the boiler and feed-water heater are at one end inter-connected by pipes E. At the other end, a return pipe F leads into the bottom of the feed-water heater; and a delivery pipe G leads from the top of the boiler.

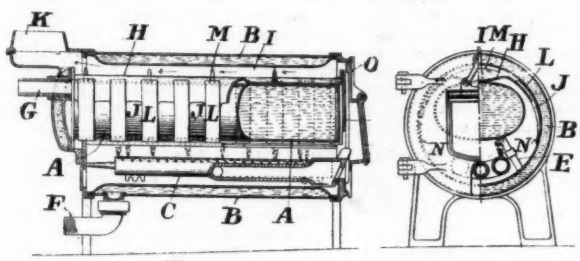


Fig. 2.

Fig. 1.

Stimson's Water Heater.

The flames from the burner impinge directly against the underside of the boiler, but after sweeping round the flanks of the boiler are prevented by a baffle plate H from direct impingement against the crown of the feed-water heater B. This baffle plate consists of an arched metal plate fitting the curvature of the flanks of the arch of the crown of the feed-water heater, and spaced apart from the middle portion of the crown thereof sufficiently to provide a flue space I, to which access is obtained by slots J extending from the longitudinal borders of the baffle plate. In other words, the baffle plate has the configuration of an arched double comb, the middle solid intermediate portion of which has a channel I spaced away from the surface of the crown of the feed-water heater. One end of the channel I communicates with a flue outlet K. The flanks of the baffle plate have, between the slots J, ribs L in contact with the feed-water jacket. The channel flue space I is obstructed by transverse ribs M on the upper surface of the baffle plate, which cause the products of combustion closely to sweep the crown of the feed-water heater.

The products of combustion, after encircling the oval boiler A, impinge against the underside of the solid channel portion of the baffle H, curl back, and then pass through the slots J to the middle channel I, from which they escape by the flue outlet K. The products in passing are in direct contact with the surface of the inner wall of the cylindrical feed-water heater. Also, the heat absorbed by the solid portion of the baffle from the impinging products of combustion is conducted to the wall of the feed-water heater by the metal ribs between the slots.

Conveniently the baffle plate is an iron casting, and to facilitate cleaning is withdrawable endways, being removably supported with the lateral portions in contact with the flanks of the crown of the feed-water heater by angle bars N. It is removed by opening a main door O at one end of the apparatus, which door is shielded from the products of combustion by an end plate depending from the baffle plate. A smaller door gives access to the burner.

Gas-Washers.—No. 184,060.

FLORIN, A., of Berlin.

No. 21,103; Aug. 9, 1921.

This washer consists merely of a rotatable casing turning on the ends of two pipes, forming the inlet and the outlet for the gas to be cleaned, and two perforated cylinders fixed to the casing concentrically one within the other and rotating with the casing. The annular space between the cylinders is filled with the washing bodies, and divided by one or more partition walls, which also rotate with the cylinders and the casing. The walls have an opening at the circumference, or openings alternately at the circumference and at the centre, for the passage of the gas. Besides the extremely simple construction of the washer, full saturation of the washing liquid is attained. The annular space filled by the washing bodies forms a filter of an extremely large surface, offering a relatively small resistance to the gas passing, so that the loss of pressure is diminished.

Connecting a Pipe to a Main under Pressure.—No. 184,106.

SOUTH METROPOLITAN GAS COMPANY, and METHERINGHAM, J. T., both of Old Kent Road, S.E. 15.

No. 30,622; Nov. 16, 1921.

This invention relates to a process of joining a pipe to a main which consists in drilling a series of holes in, or otherwise weakening, the main so that a portion can be broken away therefrom, permanently attaching a saddle to the main, breaking away the weakened portion by means of a rod carrying a stopper such as a flexible disc adapted to prevent the escape of gas from the main, attaching a pipe to the saddle, and drawing the stopper through the pipe. The piece is broken from the main by tightening a nut upon a stopper fixed in the saddle. Then the stopper is removed, a guide disc and a shackle fixed to the rod for drawing-through the flexible disc as successive lengths of pipe are fitted.

Bearings for Supporting Gasholders.—No. 184,120.

BROADHEAD, R. W., of Elland.

No. 873; Jan. 11, 1922.

This invention deals with improved means whereby gasholders may be supported, and has for object to provide such means in the form of revoluble axleless bearings or pieces, to be used in conjunction with the guide rails of spiral holders, or with the standards of ordinary column holders, or with the vertical guides on holders. This axleless bearing was described and fully illustrated in the "JOURNAL" for July 5, pp. 28-9, and we shall accordingly merely extract the claims of the patentee, for record purposes. He claims:

Means for supporting gasholders, consisting of revoluble bearing pieces without mechanical axles, and capable of being mounted adjacent to grooved or shaped guide rails, guides, or standards. The bearings, when mounted in position, come adjacent or near to the sides or webs of the guide rails, guides, or standards, and are capable of being mounted in inclined form.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 30.]

Nos. 22,654 to 23,239.

BROADHEAD, C. F.—"Manufacture of combustible gases." No. 22,884.

BURN, L.—"Gas-producers." No. 23,160.

DAVIS, A. R.—"Gas or oil water-heaters of the cascade type." No. 23,099.

GRIFFITH, F. W.—"Incandescent gas-burner." No. 22,659.

KEITH, G., and KEITH & BLACKMAN COMPANY, LTD, J.—"Apparatus for heating buildings, &c." No. 22,797.

KNIGHT, J.—"Gas stoves, ranges, &c." No. 23,105.

PHŒNIX ENGINEERING COMPANY, LTD.—"Apparatus for heating and distributing tar, &c." No. 22,947.

POWNALL, P. E.—See Phœnix Engineering Company, Ltd. No. 22,947.

RUTHERFORD, R.—"Automatic gas cut-off." No. 22,713.

THOMAS, E.—"Apparatus for mixing gases automatically." No. 23,110.

Melton Mowbray Gas Company.—At the annual meeting of the Melton Mowbray Gas Company on Friday last, it was reported that the profits for the year amounted to £2453. It was decided, upon the recommendation of the Directors, to pay a dividend of 2 p.ct., the balance to be carried forward. The Chairman (Mr. Shafto H. Sikes) stated that the price of gas would be reduced from 6s. 8d. per 1000 c.ft. to 6s. as from July 1. A bonus of £50 was awarded to the Manager (Mr. M'Dougall) for his efficient services since he has been in charge of the undertaking.

Public Lighting at Machynlleth.—The chief subject discussed at the last meeting of the Machynlleth Urban District Council was that of public lighting. The terms of the Gas Company were 37s. 6d. per lamp for gas only, the Council to light, extinguish, and pay for the mantles. This extra cost was put down at 25s. to 30s. per lamp, making the total cost from £3 to £3 10s. The Surveyor reported that he had written to the Company announcing the Council's decision to pay on actual consumption, which could only be arrived at by meter; but they could not see their way to alter their terms. Members were given to understand that 18s. 9d. per lamp would be a fair price for gas, and it was asked why there should be such a difference. It was also stated that the Company's objection to the meter system was that wastage occurred of which there was no record. It was not possible to have a meter on every lamp, and the taps might be turned on. Mr. Lumley proposed that they offer 30s. per lamp. Mr. Evan Humphreys supported this, and added that in the event of refusal a public meeting of townspeople should be called to decide whether to pay or go without gas and leave the town in darkness. There was something in what the Company said about waste; but there was too much difference between 18s. 9d. and 37s. 6d. Eventually Mr. Lumley's proposition was agreed to.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" regarding applications to the Board of Trade for Orders under the Gas Regulation Act.

SPECIAL ORDER.

Ipswich Gas Company.

Notice is given of an intended application to the Board of Trade by the Company for a Special Order under section 10 of the Act for authority to carry out a stock conversion scheme, to prescribe a new sliding-scale, to raise further money, to appoint managing-directors, to use scheduled lands for gas-works purposes, to extend the limits of supply so as to include the parishes of Purdis Farm and Alnesbourne Priory, to establish a scheme of co-partnership, to regulate the supply of gas, and for other purposes.

DECLARATIONS OF CALORIFIC VALUE.

Horley District Gas Company.—475 B.Th.U. (Sept. 1.)
Milton Regis Urban District Council.—460 B.Th.U. (Oct. 1.)
St. Austell Gas Company, Ltd.—450 B.Th.U. (Sept. 29.)
Tonbridge Gas Company.—400 B.Th.U. (Sept. 30.)

GAS REGULATION ACT ORDERS.

There have been received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Castleford and Whitwood Gas Light and Coke Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 16·4d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five. (Aug. 24.)

St. Austell Gas Company, Ltd.

After the declared date: (i) The standard price in respect of gas supplied by the undertakers shall be 18d. per therm; (ii) the price of 17·2d. per therm shall be substituted for the price of 4s. 2d. per 1000 c.ft. mentioned in paragraph (2) of the proviso to section 15 (price of gas with sliding-scale as to dividend) of the St. Austell Gas Order, 1936.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-one-half.

Prepayment meter clauses are included. (Aug. 25.)

SHREWSBURY GAS COMPANY.

The 102nd Annual Meeting of the Company was held on the 1st inst., under the chairmanship of Mr. J. B. LLOYD.

The CHAIRMAN, in moving the adoption of the report and accounts, said the year under review had been a more peaceful period than it had been his good fortune to look back upon for a considerable time. He trusted that they were entering smoother waters, in both the political and the industrial world, for jealous strife, whether local or national, was the negation of prosperity. The Company, as they were only too well aware, suffered severely from the effects of long years of strife; but there was every indication of better times, and their balance-sheet was, he believed, a happy augury for future prosperity. An additional amount of £3745 loan capital had been raised during the year, thus completing the £10,000 authorized under the Shrewsbury (Capital Issues) Order, 1920. When he addressed them a year ago, they were just recovering from the prolonged coal dispute, the cost of which was reflected in the accounts. Since then there had been a gradual easement in coal prices, but the reduction in freight charges had been very slight. They had replenished their stock of coal, and had written-down its value, and that of other stores in the accounts, to a low figure. The expenditure for coal and gas oil used during the year was £7178 less than last year; but, on the other hand, residual products had yielded £2928 less, owing to falling markets. The item for repairs and maintenance of works and plant included one-fourth of the £34,000 carried to suspense account last year in respect of carbonizing plant renewals. The balance could legitimately be spread over three more years, owing to the economies effected by the installation, which would be of permanent benefit to the concern. Their sales of gas during the year had increased by nearly 7 p.ct., yielding £4850 more than the previous year. The total net receipts were £4933 more, and the expenditure £3851 less. After paying loan charges, the balance of profit available for dividend amounted to £12,082. Under the sliding-scale, however, they could not pay more than 4¼ p.ct. in respect of the year to June 30, as the highest price charged for gas during the accounting period governed the dividend payable. Nevertheless, the Directors felt justified in reducing the price of gas at the end of March, and had made a further reduction as from June 30 equivalent to 2¾ p.ct. on the sliding-scale.

The report having been adopted and the dividend declared, the Chairman moved a vote of thanks to the Engineer, Secretary, and Manager (Mr. C. M. D. Belton) and the staff. He remarked that Mr. Belton had shown great ability and foresight, and it was largely due to his business acumen that the Directors were able to present such an encouraging report that day.

BARNET DISTRICT GAS AND WATER COMPANY.

Satisfactory Dividends—The Therm System of Charge.

The Ordinary Half-Yearly Meeting of the Company was held on Monday last week, at the London Offices, No. 139, Cannon Street—Mr. ARTHUR F. PHILLIPS in the chair.

The SECRETARY (Mr. E. D. Davey, A.C.A.) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said that, considering both the gas and the water undertakings were carried on under normal conditions, without any additional powers authorizing increased prices, the results might be considered satisfactory. In the gas undertaking, coal, oil, and coke cost £19,144, against £21,192 in the corresponding previous half year—a saving of £2048. Wages for carbonizing showed a saving of £1308. There was also a saving of £339 in the cost of purification. Other expenses remained much the same. The receipts for gas were £32,994—an increase of £1400; and the receipts for bye-products were £8706—an increase of £483, an unusual result this half year, and highly satisfactory. The result of the working was a revenue balance of £8991, as against £4410 the corresponding previous year, when the Company suffered from the coal strike. In the water undertaking, the pumping charges were £6784, as against £8196 last year—a reduction of £1412. Repairs of works were £3372, as against £2283—an increase of £1099; and repairs of mains were up £373. The total expenditure was £19,464, against £19,346—practically the same. The water rental showed only a slight increase—being £27,822, against £27,171 the previous year. The balance of revenue was £8461, against £7924—an advance of only £651 The £8991 from the gas undertaking and the £8461 from the water undertaking, added to the balance brought forward, gave an available balance of £29,527, from which the dividends recommended would require £10,754, leaving £18,773 to carry forward, which was £4639 less than the previous year. For some few half years the Company had not earned the dividend, and had had to draw on their carry-forward; but it was considered advisable to defer asking for an increase in the charges for gas and water as long as the carry-forward was satisfactory. Notwithstanding the reduction which had taken place in the cost of materials, coal, and labour, the results showed that the dividends recommended had not quite been earned, though the working of both the undertakings had been most efficient, and economy had been studied in every way. The district was not an easy one to supply with water; no considerable quantity being obtainable at any one of the pumping stations. There were five pumping stations continually working; and to meet the increasing consumption, a sixth was in course of construction at Roestock. This all added to the working expenses.

NEW GAS AND WATER ORDERS.

The Company made an application under the Gas Regulation Act of 1920, which was considered by the Board of Trade at an inquiry held on March 16 last. Previous to this, negotiations took place with the representatives of the various local Councils who were interested, and the Order was subsequently made by the Board of Trade substituting prices per therm in place of the then existing charge per thousand cubic feet. The Company had declared a calorific value of 475 B.Th.U. per c.ft., and the alteration in the method of charge commenced from the reading of the meters at Midsummer; the charge being 13d. per therm, which was now universal throughout the district. They were also obliged to apply for an Order under the Water Undertakings (Modification of Charges) Act, 1921, for modifying the Company's existing statutory charges for water, which were too low to meet the increase in the cost of fuel, labour, and all material required. A prolonged inquiry was held by the Ministry of Health on April 11; the Hertfordshire County Council and the local Councils being represented by Counsel and expert witnesses. The Ministry, after carefully considering the application and evidence, and the opposition thereto, on May 25 granted an Order authorizing moderate increases in the water charges, dated from Midsummer, 1922. Some of the consumers had complained of the increase, and there had been articles and correspondence in the local papers; but they overlooked that charges of everything necessary for carrying on a water undertaking had greatly increased. The Company asked for an additional 25 p.ct.; and after the exhaustive inquiry, the Ministry of Health granted 20 p.ct.—showing that the application was justified. The increase only meant (say) on a house rated at £40 that the water-rate would be increased from 11s. 3d. to 13s. 8d. per quarter. Water companies and corporations owning water-works were generally increasing their charges. The Metropolitan Water Board had increased 60 p.ct.; and companies in the districts adjoining had added to their charges much more than Barnet—in some cases 60 p.ct.

THE THERM SYSTEM.

There had been articles in some of the papers respecting the altered system of charging for gas by the therm instead of by the thousand cubic feet, and some consumers had complained that their gas accounts for the quarter had increased in consequence. Gas companies were not seeking to obtain in this way a higher price for gas, or to be guilty of anything like trickery. The consumer was only charged for the value received; and if the account was rendered and charged for in therms or cubic feet, the result would be the same, because the one was the equivalent of the other. There were always some customers whose accounts showed increases on the corresponding previous quarter because they had used more gas; while there were others whose accounts showed a reduction. The proof that companies derived no benefit from the change lay in the fact that the total revenues showed no increase from such cause. The change in the system of charging was not demanded by the gas companies; it was forced upon them by law, as the Government considered it better for the consumer to pay for the heat received rather than for the gas in bulk. He could not help feeling it would have been well to have continued to charge by the 1000 c.ft.; the gas being of a stipulated calorific value, as it used to be of a stipulated illuminating power. It would

have been better understood by the consumer, who now, when he received the account in therms, if he wished to check it, must go to the card on the meter to ascertain the quantity of gas supplied, and himself convert it into therms. It would also have saved work in the gas companies' offices in converting all the consumptions of thousands of cubic feet into therms. The new method of charging had, however, become law; and they had all to get used to it. The supply of gas by the therm would be a difficulty for the small gas-works which were not able to keep anyone capable of testing the gas for calorific value. They would have to provide costly instruments, and keep them in order.

MR. SAMUEL CUTLER.

He regretted to inform them that since the last meeting Mr. Samuel Cutler, in consequence of failing health, had considered it advisable to resign his seat on the Board. He had been a most useful member for several years. To the vacancy, Mr. Samuel Cutler, Junior, had been appointed. His experience as an Engineer would be of great service to the Company.

The DEPUTY-CHAIRMAN (Dr. J. W. L. Glaisher, F.R.S.) seconded the motion for the adoption of the report and accounts.

Mr. C. P. CROOKENDEN, referring to the public discontent at the raising of the water-rate and in some cases at their gas bills, said they all hoped to be able early to reduce the price of gas, though the coal position still presented difficulties.

Mr. J. MACKWORTH WOOD remarked that they appreciated the difficulties which faced the Board. He feared the Company were not yet out of the wood; but they were grateful for the results shown in the balance-sheet, which reflected the ability of those responsible.

Thereafter the motion was unanimously carried.

The CHAIRMAN next proposed, Mr. COLIN DOCWRA seconded, and it was carried, that dividends be declared for the half year ended June 30 at the rate of £9 p.c. per annum on the "A" and "C" stocks, £8 p.c. on the "B" stock, and £6 6s. p.c. on the "D" capital gas and water stocks.

The CHAIRMAN said he now had a pleasant resolution to put to the meeting—a vote of thanks to the officers of the Company, whose affairs had been carefully and efficiently controlled by Mr. Bancroft and those under him. The economies effected had brought results which enabled the payment of satisfactory dividends. Their Secretary (Mr. Davey), too, assisted greatly by his work and close attention to the accounts. He proposed a hearty vote of thanks to the Engineer, the Secretary, and their staffs.

The proposition was seconded by Mr. ALFRED WOOD, and carried *nem. con.*

Mr. F. J. BANCROFT, responding on behalf of the officers and staff, stated that all were working well together. He hoped the troublous times foreshadowed by the two shareholders would be overcome by the efforts of the staff, as they had been in the past.

Mr. CROOKENDEN proposed, and Mr. FOSTER seconded, a vote of thanks to the Chairman and his Board, and the CHAIRMAN'S acknowledgment brought the proceedings to a close.

EASTBOURNE GAS COMPANY.

The annual meeting of the Eastbourne Gas Company on the 28th ultimo (when dividends equal to those of pre-war days were declared) was presided over by Mr. CALEB DIPLOCK.

The Directors reported that there was a balance of £24,713 to the credit of the profit and loss account. They recommended the payment of dividends for the half year ended June 30 at the rate of 7½ p.ct. per annum on the "A" stock, 6¼ p.ct. per annum on the "B" stock, and 5 p.ct. per annum on the preference stock. These dividends would absorb £8785, and leave a balance of £15,928 to be carried forward.

In moving the adoption of the report and accounts, the Chairman alluded to the salient features of the half-year's working. The number of gas-stoves hired was 10,345, and there were 12,416 meters in use. Coal had cost less by 16s. 5d. per ton, and there had also been a saving on the price of oil. These reductions represented a total gain of £7076 during the half year. A reduction of 1d. per therm in the price of gas was being made for the current quarter, and also for the next quarter; and the Directors anticipated that they would be able to make yet another reduction in price before this period had expired. Customers were now getting a far better quality of gas than ever before. Regarding complaints as to a rise in gas bills, he said the high quality of the gas seemed to be overlooked, and as the waste was not noticed the gas appeared to be dearer.

The motion was carried. Mr. F. H. Jones and Mr. B. Bradford were re-elected Directors, and the remuneration of the Board was increased by £100. The last increase, it was stated, was made ten years ago.

A vote of thanks was acknowledged by the Chairman, Mr. W. H. Hammond (the Resident Engineer), and Mr. J. S. Garrard (the Secretary). It was mentioned that the Company are employing more men than ever before, owing to the large amount of business being done in supplying and fixing gas appliances.

Northallerton Consumers' Gas Company, Ltd.—The profit and loss account of the Company for the year ended June 30 shows a balance of £1385 available for distribution. Out of this the Directors recommended that £300 be transferred to the reserve fund, and that a dividend at the rate of 8 p.ct. per annum (less income-tax) be paid.

Combined Gas and Electricity Scheme for Retford.—The Chairman of the Gas Committee (Mr. V. S. Woods) announced at the monthly meeting of the Retford Town Council that it had been resolved to ask Sir Charles Bright and Partners to report on the possibility of adopting a municipal supply of electricity in conjunction with the gas department. The report would be very valuable, in view of the inquiry to be held in October with regard to the scheme for the East Midlands district. It might be possible to supply electricity by means of engines using their gas.

TORONTO'S EIGHTY YEARS' GAS SERVICE.

The first gas-works in Toronto were built by Mr. Albert Furness, from whom the Consumers' Gas Company purchased them in 1848. As a matter of fact, the streets of the city were lighted by gas on Dec. 28, 1841. In the first year of the Company's history there were 317 consumers, and 164 street-lamps; the total output of gas for the year being 5,834,000 c.ft., or about 40 p.ct. of the output for one day in 1921. The population of the city in that year was 23,503. Fifty years ago (in 1871), the Company had 1566 consumers, which number has now increased to 127,555, while in the same period the output of gas has gone up from 52,595,000 c.ft. to 5,033,986,000 c.ft. In 1871 there was one gas-meter for every 36 inhabitants, whereas the proportion is to-day one for every 4·5 of the population. The tremendous growth in the output during the last decade—from 2,843,041,000 c.ft. in 1911 to the figure just named of 5,033,986,000 c.ft. in 1921—is due mainly to the fact that gas has come into wide industrial use in the city.

The total paid-up capital stock of the Company is $6,000,000. The dividend payable is 10 p.ct. per annum on the par value; but as the greater portion of the stock was issued at a substantial premium, the average return upon their investment received by the shareholders (who are almost all resident in the city) is about 6 p.ct. If in any year the net profits of the Company exceed the amount required to pay the 10 p.ct. dividend, maintain the reserve fund, and make the authorized payments to the renewal fund, the surplus must be credited to a special surplus account, applicable to a reduction in the price of gas to consumers when the amount is equal to 5 c. per 1000 c.ft. on the quantity of gas sold during the preceding year. In practice, however, it has been the uniform policy to reduce voluntarily the price of gas before the amount in the special surplus account would compel a reduction.

Throughout, the undertaking has been in a position to offer to consumers favourable charges for gas; and it has maintained a prominent position in this respect in spite of having had certain drawbacks to contend against.

DUNFERMLINE CORPORATION GAS DEPARTMENT.

Mr. James Campbell, as Engineer and Manager, has presented to his Committee a report on the working of the Dunfermline Corporation Gas Department for the year ended May 15.

This shows that the expenditure on revenue account, including capital and other expenditure charged to revenue, amounted to £52,121, a decrease of £15,843, and the income to £66,447, a decrease of £16,653, compared with the previous year. The result is a gross profit of £14,325, to which is added the sum brought forward (£756), making a total of £15,081. From this are deducted payments for interest and sinking fund amounting to £13,833, a further £500 is placed to retort repair fund (making this fund £1000), and the balance of £747 is carried forward.

The coal carbonized during the year amounted to 16,675 tons, costing £23,901, being an average of 28s. 8d. per ton. Contracts have been entered into for requirements up to and including March next at 19s. 11d. per ton. The quantity of gas made was 275,640,000 c.ft., an increase of 23,304,000 c.ft., equal to 9·23 p.ct., while the coal used shows a decrease of 2733 tons. The average yield of gas per ton of coal over the year amounted to 16,530 c.ft., compared with 13,001 c.ft. last year, when the vertical retorts were in operation for only nine months. It is of interest to note that the consumption of coal was only very slightly more than in 1912, when 145 million c.ft. were made, compared with 275 millions last year. The average yield of gas per ton of coal for the years 1911-1914 inclusive was 8788 c.ft., and at this rate it would have required an additional 14,690 tons to have produced the amount of gas made in the past year.

The total wages paid on revenue account during the year amounted to £10,481, equal to 9·12d. per 1000 c.ft. of gas made. The number of men employed was 49 in June and 49 in December, compared with 68 and 56 on corresponding dates in the previous year.

The net income for residual products amounted to £13,044, compared with £27,152, a decrease of £14,107, which more than wipes out the saving of £13,385 on coal. This return from residuals is equal to 15s. 7¾d. per ton of coal, or 54·58 p.ct. of the cost, making the net price of coal 13s. 0¼d. per ton. The amount of coke and tar available for sale was seriously reduced by the inferior coal used during the latter period of the coal strike, while for three months the price of sulphate of ammonia was so low that it was unprofitable to make it, and the ammoniacal liquor was run to waste.

A new exhauster of 100,000 c.ft. per hour capacity, and a new compressor of 50,000 c.ft. per hour capacity, were brought into use last December. The old horizontal retort-bench has been demolished, and the work of converting the old retort-house into a coal store is now proceeding. The gas supply for Inverkeithing was turned on last December, with satisfactory results to the Corporation as suppliers and to the consumers through reduced price. A contract has been entered into for the erection of a spiral-guided holder of 1¼ million c.ft. capacity, the foundations of which are now completed.

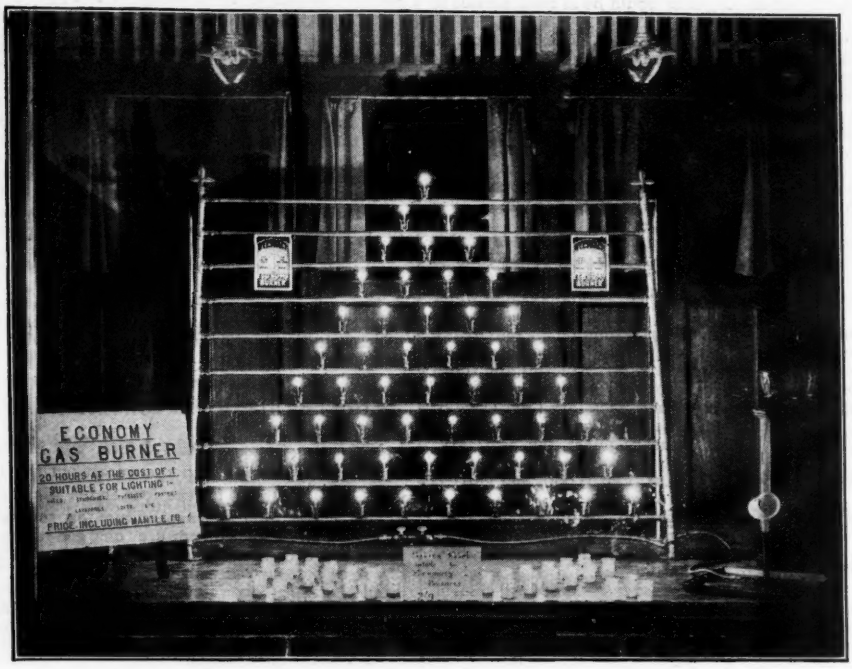
The price of gas was reduced as from the December reading of meters from 4s. 2d. to 3s. 11d., and again from the March readings by a further 9d., making the price 3s. 2d. per 1000 c.ft. for ordinary consumers, and power rates from 2s. 2d. to 1s. 10d. per 1000 c.ft. which are among the lowest prices in Scotland.

New Gas-Works for Carlisle.—An early reduction in the price of gas at Carlisle is foreshadowed, with the inauguration of new works, which are to be opened by the Mayor on Oct. 6. These new works are being equipped with Glover-West vertical retorts, to meet a demand of 2 million c.ft. of gas per day, with provision for easily increasing the output to 3 millions. The outlay on the works is estimated at about £250,000.

THE WELSBACH UPRIGHT ECONOMY BURNER.

The Tottenham District Light, Heat, and Power Company are giving, in the windows of their showrooms at High Road, Tottenham, an exceptionally attractive display of the new and improved Welsbach "Economy" burner. In view of the Press campaign upon economy in gas, this exhibit is particularly interesting. The illustration shows the effect at night time.

Lights are often required in such places as passages, lavatories, lobbies, &c., where a full-sized burner would be an extravagance, both in light and gas consumption. To meet this contingency, the Welsbach "Economy" burner has been put on the market; and it is claimed that it fulfils the desired requirements in every direction. The burner is solidly constructed on sound scientific principles to produce the highest efficiency, which statement is substantiated by the fact that the burner, using gas at 10d. per therm, gives five hours light of about 25 c.p. at a cost of something under one farthing. The mantles used are made with a clay ring, which fits the head of the burner snugly. The mantle rod used in nearly all upright burners, and its accompanying instability, with wear and tear on mantles, is entirely eliminated, and the "Economy" mantle, with care, has an exceptionally long life. The burner may be used with or without protection for the mantle. In the former case, a small glass holder is fitted, which will take any type of bijou inverted globe, or a small glass chimney which has been produced specially for the purpose. The resulting effect is very agreeable. The burner thus equipped has a most pleasing appearance, and will be appreciated both for the highly economic results obtained and for the dainty and artistic effect produced.



GAS EXHIBIT AT BRISTOL.

A "Bristol First" Exhibition, held in the Colston Hall, and organized with the definite purpose of creating interest in Bristol-made goods, has proved a great success, the total number of visitors during the first week being about 16,500. It is hoped that as a result citizens will be induced to give preference, when making purchases, to goods manufactured in Bristol.

One of the stands was occupied by the Bristol Gas Company, who thus had an excellent opportunity of drawing attention to the benefits which they are in a position to (and do increasingly, as the growth of their business shows) confer upon the city. The increasing demand for gas for domestic and industrial purposes is indicated by the following statistics relating to the progress of the Company's business:

	Number of Consumers.	Number of Cookers on Hire.
1890	20,500	1,587
1900	30,033	13,095
1910	56,303	43,770
1920	72,147	61,618
1922	75,000	65,000

It is estimated that over 1,000,000 meals are cooked daily by gas in Bristol; and in the Company's area of supply there are 400 miles of mains and 300 miles of services. Many thousands of gas-fires are in daily use, and the increasing application of gas to the numerous purposes for which it can be utilized has a very considerable effect in clearing the atmosphere in Bristol by limiting the smoke nuisance. Last year over 3200 million c.ft. of gas were consumed in Bristol; and in the manufacture of this quantity more than 200,000 tons of coal were used, in addition to 1 million gallons of gas oil, thus providing regular employment for a considerable number of men in the coalfields and the distributing agencies. A very large percentage of the coal is drawn from the adjoining Somerset coalfields.

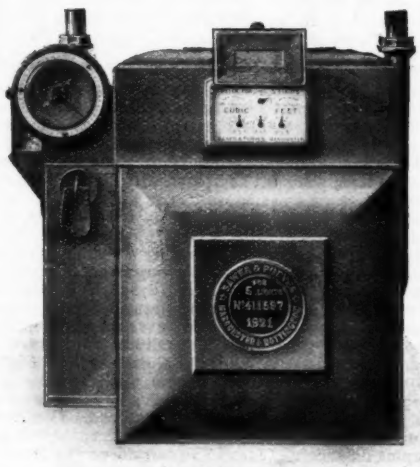
In fact, £125,300 was paid last year for coals supplied in this area alone, which is an important factor in providing employment and in maintaining the collieries in the district. The Company also pay £27,000 in local rates, while over £200,000 was paid last year to employees in wages, &c. For general requirements over £50,000 was spent in Bristol in 1921, which gives a total of £400,000 paid by the Company last year in Bristol alone. About 1200 men are regularly employed, while indirectly many hundreds are engaged in Bristol in the working-up of tar and ammonia products. Over 2½ million gallons of tar are produced yearly in the city, which when distilled, refined, and made suitable for the surface tarring of roads, would cover a distance of about 1500 miles. An interesting exhibition of tar products at the Colston Hall gave a clear idea of their value. The ammoniacal liquor produced at the gas-works is converted locally into 2500 tons of sulphate of ammonia. Also over 100,000 tons of gas coke is produced annually, and is extensively used locally for industrial and domestic heating.

Beighton and Coke-Oven Gas.—The Beighton Gas Company have decided to discontinue manufacturing gas at their own works, and in future to purchase supplies from the Waleswood and Beighton Collieries. By this means, it is expected that a considerable saving will be effected, as gas is now going to waste at the colliery coke-ovens. The collieries are already connected with the gas-works by a main, and the Beighton gas consumers will shortly be having the new supply.

Barnsley Gas Company.—The Directors of the Barnsley Gas Company recommend a dividend for the year ended June 30 of 7 p.ct. on the general capital stock, less income-tax. The revenue for the twelve months amounted to £66,833, and the expenditure was £62,580, leaving a balance to be carried to profit and loss account of £4252. By sales of gas the sum of £48,733 was realized, and residual products brought in £17,263. The chief items of expenditure were manufacture of gas (including £27,003 for coal), £44,021; distribution, £7506; and rent, rates, and taxes, £6382.

Suggested Gas-Works Purchase at Bridlington.—The question of making an offer to the Company for the purchase of the local gas-works is under consideration by the Bridlington Town Council. Last week the members discussed a recommendation of the Parliamentary Committee that a Sub-Committee be appointed to deal with the matter of engaging expert advice. The resolution was carried by one; but an amendment was subsequently agreed to that the whole subject be considered by the Council sitting in Committee. The members thereupon sat in private to deal with the question.

Bognor Gas Company.—Mr. J. G. Denton, who has succeeded the late Mr. Henry Levett as Chairman of the Bognor Gas Light and Coke Company, occupied the chair at the half-yearly meeting. The report of the Directors revealed a considerable revival of prosperity in the Company's business, a balance of £7168 being carried to the credit of profit and loss account, after providing for the payment of the maximum dividend for the half year—viz., 5 p.ct. per annum upon the whole of the consolidated stocks, less income-tax. The Chairman said the Company had not only been able to reduce the price of gas 1s. 7d. per 1000 c.ft., but they were also making a further reduction of 1d. per therm, which was equivalent to 5d. per 1000 c.ft. The dividend recommended was approved. Mr. W. H. B. Fletcher has succeeded the late Mr. Levett on the Board of Directors.



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NOTTINGHAM THERM CONTROVERSY.

With a view to the removal of many misconceptions, which have occasioned a prolonged controversy in Nottingham, relative to the application of the Corporation to the Board of Trade for the adoption of the therm system of charging, a practical purpose has been served by the issue of a semi-official statement which is calculated to go far towards removing misunderstandings.

The proposed new arrangement had been characterized in Nottingham as something in the nature of a subtle attempt to impose added burdens upon consumers, who it is suggested have not been receiving value for money in regard to the quality of the gas supplied; and there has been some animated talk locally about convening a meeting in protest against the Corporation action. It is as well, therefore, that an authoritative explanation should have been rendered available, in which it is emphasized that the mere change-over from cubic feet to therms cannot possibly make any difference to the consumer. It has been pointed out that the thermal basis of charging was first suggested by the Fuel Research Board, as a more scientific and definite method. The official exponent of the Nottingham position may also be credited with being on sound ground in declaring his conviction that the consumer will get more satisfaction from the thermal system. Moreover, he has pointed out that the new system is really obligatory.

"The thermal system," he adds, "cannot possibly make the slightest difference to anybody. The present agitation is the result of a misconception on the part of people who, for various reasons, have had a higher gas bill than they expected, and who are living in places where the new system is already in operation. We get scores of complaints every quarter. In one instance that I know of we ultimately discovered that during the whole three weeks the family were away on holiday, a servant had left a jet burning in an attic; but all such causes of high gas bills will now, I suppose, be attributed, for a time, to the thermal system of charging. The new system cannot possibly increase the rate of payment." Still the opposition in Nottingham continues with considerable force, all kinds of exaggerated notions having been imported into the controversy, based largely upon recent Metropolitan journalistic denunciations. Experience, however, will probably be found to operate largely in the direction of bringing about a modification of views in Nottingham, as elsewhere.

Meanwhile, opposition to the Order continues to be very pronounced in Nottingham; members of the Notts and Derbyshire Traders' Association, a representative organization, having at their last meeting adopted a resolution urging that, having regard to the great divergence of the opinion of experts as to the adoption of the therm system, there should, before its introduction into Nottingham, be a very searching inquiry into the various points at issue.

THERMS AND GAS ACCOUNTS.

An Address at Dudley.

Much useful information was given regarding the present position of the gas industry by Mr. F. C. Briggs, the Engineer and Manager to the Town of Dudley Gas Light Company, in a recent address to local Rotarians.

In the first place, Mr. Briggs explained the operation of the therm system, and the effect it would have in Dudley. He pointed out that gas in the past has been sold by volume in every area, irrespective of its real value to the consumer, and therefore prices in different areas were not comparable. The standard of quality has been the candle power; but the lighting power of gas is no criterion of value to the consumer in any way except in an open-flame burner. In cookers, gas-fires, engines, and incandescent burners the heating power of the gas is the only characteristic of service. In future, gas will be sold by its heat content, and not by volume. Consumers in every district will therefore know exactly the price they are paying for the value received. The therm is the standard which has been set by the Government.

Mr. Briggs went on to say that, though an Order under the Gas Regulation Act had not yet been granted to Dudley, yet the obligations as to pressure and constant quality are being, and have been since the war, observed by the Dudley Gas Company. He showed the members records taken constantly day and night of the pressure and quality of the gas leaving the works, which permit of adequate control and instant rectification of any deficiency occurring from unforeseen causes. The introduction of the therm system into Dudley would not cause any increase in the price of gas or any reduction in the quality. The value received for money would therefore remain the same until, as he hoped, circumstances allowed still further reduction in price. As to Press criticism, the industry and the Dudley Gas Company do not fear, in fact welcome, criticism, but criticism that is fair and well informed—not attempts to form adverse public opinion upon erroneous assumptions.

He then touched upon another point that is often raised—why the gas consumption of a certain quarter should be greater than that in the corresponding quarter of the previous year. The cause of this trouble, Mr. Briggs declared, is usually the long credit of three months that ordinary consumers enjoy. It is almost impossible to remember actually the conditions three months or twelve months previously. Then the weather has some effect. The mean maximum temperature at Edgbaston Observatory during April to June last year was 65° Fahr., but only 60° this year. Again, the sunshine this year was only 499 hours, compared with 589 hours last year. Meters do not elongate gas accounts—in fact, more often than not they are passing gas unregistered, to the loss of the Company. Of 3332 slot meters that had recently been tested, 1687, equal to over 50 p.c., were slow, or registering against the Company, while only nine were fast.

Briefly reviewing the recent troubled times, mention was made by Mr. Briggs of the railway and coal strikes, during which the Dudley Gas Company had maintained a full supply in every way, and had endeavoured to help the town by hauling foodstuffs and placing coal at the disposal of the Corporation.

"THE GREAT ESCAPE OF GAS."

The editorial columns of the issue of "Truth" dated Aug. 23 include an article headed "The Great Escape of Gas," in which reference is made to the part taken by the "Daily Mail" in the press agitation over therms and high gas bills. The writer concludes with the following paragraphs:

I was talking the other day with a Director of one of the larger Metropolitan Gas Companies, who told me that they always had a certain number of dissatisfied customers who questioned their accounts—the number of these questioned accounts averaging about four hundred quarterly. The Company keep a special staff to investigate all complaints of the kind. Nineteen times out of twenty the complaints are found to have nothing in them. In the few genuine cases, mistakes are adjusted. But since the "Daily Mail" started its campaign, the number of customers who have written questioning their accounts has risen to *fifteen thousand*. Everyone of these cases investigated up to now has been found entirely frivolous. And the only result has been to throw extra expense (for increased staff) on the Company, for which consumers will, of course, ultimately have to pay in the price of gas.

But why, then, are most of our gas bills for the June quarter, 1922, larger than they were for the June quarter, 1921? The explanation of the companies is that in 1921 more favourable weather conditions and considerations of prudence imposed by the coal strike led people to be extra economical in their consumption of gas. This year, under different conditions, such economy has not been practised. The companies say that there has been a marked increase in gas consumption, and the reason why our gas has cost us more is simply because we have burnt more. If any one doubts that, let him look at his meter, where (despite the introduction of the wicked "therm") he will still find his consumption registered in terms of cubic feet.

Now the Whitefriars people must, as I have said, know all these facts as well as I do. Indeed, I am quite certain that they know them, for they have (to my knowledge) been laid before them several times, and have been consistently ignored. Facts or no facts, the gas stunt, once launched, must be allowed to run its hectic—not to say hysteric—course. But why this deadly animosity against the wicked "therm?" I cannot say; but it occurs to me as possible that if the thermal system were once introduced into the Whitefriars gas-works the price might have to be reduced. Measured in cubic feet, Whitefriars gas makes a tremendously imposing show, but the percentage of combustible gas in that volatile compound is not great. It has precious few "therms" in it.

The Ministry of Health are being asked by the Oswaldtwistle Urban District Council to sanction a loan for £7000 for gas-main extensions in the district.

AIRDRIE GAS-WORKS REPORT.

A yield of gas per ton of coal carbonized, including water gas from coke and oil, of 14,643 c.ft., as against 11,535 c.ft. in the previous year—an increase of 3108 c.ft.—is recorded in the report for the past financial year of Mr. Archibald Kellock, Engineer and Manager to the Burgh of Airdrie Gas Department. The quantity of gas made was 127,781,000 c.ft., as compared with 134,438,000 c.ft., a decrease of 4·88 p.ct. The gas sold was 120,315,300 c.ft., as compared with 127,000,000 c.ft. for the preceding year, a decrease of 5·26 p.ct. Both ordinary and prepayment meters showed a decrease; while industrial users consumed 10,184,300 c.ft., compared with 13,697,900 c.ft.—a decrease of 25·65 p.ct.

The total income of the undertaking amounted to £41,825, as against £48,415 for the previous year, a decrease of £6590. The gross income from residuals and bye-products was £8630, against £16,667; and after deducting cost of handling and manufacture, the net income from this source was £7410, a decrease of £6785. This large decrease is due to the very serious slump in the prices realized for residuals, and to the less amount available for sale by reason of the introduction of the carburetted water-gas plant. Expenditure on revenue account was £33,685, compared with £40,148, a decrease of £6463. For manufacture of gas and distribution there was expended £25,786, against £30,293, a decrease of £4507, this being largely due to lessened requirements of, and decreasing charges for, coal. Deducting the expenditure on revenue account (£33,685) from the income (£41,825), there is a surplus balance of £8140 to be carried to the credit of the net revenue account to meet the standing charges. Items of expenditure on net revenue account are: Instalment of loans repaid, £1452; sinking fund, £1479; and interest on loans advanced, £3666.

The total expenditure on net revenue amounted to £8366, as against £8375 last year. The sum at the credit of the net revenue account being £8323 (which is inclusive of a credit balance of £142 brought forward from last year), and the total charges against it being £8366, a debit balance of £43 is carried forward to next year.

In accordance with a decision of the previous meeting of the Llandudno Urban District Council, the Gas Committee reported to the Council last week that the salaries in the Gas and Water Departments had been reduced by 5 p.ct. as from Aug. 1 last. Mr. R. C. Baxter then moved that, as far as the Gas Manager was concerned, the matter be referred back to the Committee. Mr. H. Duxbury, he said, was competent and energetic, and they ought to give him every encouragement. They had had good managers in the past, and if only they had considered them properly they might have saved the ratepayers thousands of pounds. Mr. W. Thomas (Chairman of the Gas Committee) agreed that the Manager ought not to be punished by having his salary reduced. The matter was referred back for further consideration.

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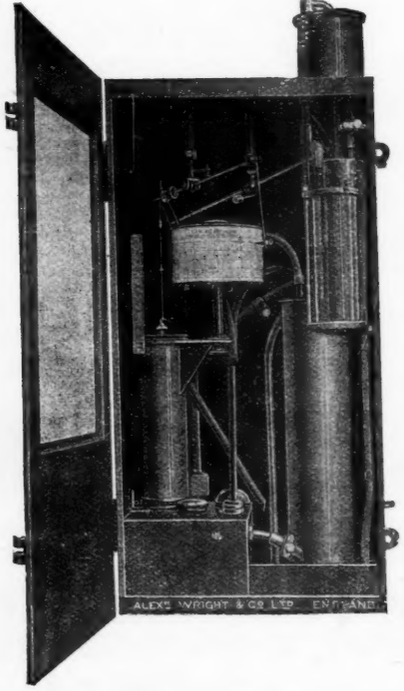

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TYLDESLEY-WITH-SHAKERLEY GAS UNDERTAKING.

Considerable improvement in the financial position is revealed by the annual report on the gas undertaking of the Tyldesley-with-Shakerley Urban District Council, which has been prepared by the Engineer and Manager, Mr. Fred Peel. The total income for the year ended March 31 amounted to £17,726, and the expenditure to £16,519, leaving a gross profit of £1206. Out of this there has been paid for interest and sinking fund charges £907, leaving a net profit of £299, which compares with a net loss for the previous year of £2301, and reduces the debit balance from £1172 to £873.

The make of gas was 52,518,000 c.ft., this being 7·8 p.ct. less than in the preceding year. The make of gas per ton of coal carbonized was 11,192 c.ft., a small reduction of 139 c.ft. per ton, which is explained by the carbonizing of 300 tons of very inferior quality slack purchased during the coal stoppage, and also by the working-up of stock coal. There was a satisfactory increase of 5·2 p.ct. in the quantity of gas sold; the unaccounted-for gas having been reduced from 30·18 p.ct. to 20·49 p.ct. As a matter of fact, the volume of gas lost was less than it had been since the year 1914-15, and was 0·98 p.ct. less than the average for the previous ten years. The average cost of coal was up 2s. 11½d. per ton, which was equivalent to £692 on the quantity used during the year, while residuals realized 9·6d. per ton less. The receipts for gas averaged 6s. 7·3d. per 1000 c.ft., as against 5s. 8·5d. a year ago.

Referring to the report during a meeting of the Council, Mr. F. Lloyd said they should not allow the opportunity to go by without a public expression of approval of the efficiency and the businesslike way in which the gas and water undertakings had been carried on during the past twelve months. Great credit was due to the Manager and the late Chairman of the Gas Committee for the success that had been achieved. The report revealed a state of affairs upon which they, as a Council, should congratulate themselves. It may be added that, so far as Mr. Peel is concerned, this approval has taken practical form, his salary having been increased £50 per annum as from July 1 last.

Cork Gas Consumers' Company.—The report submitted at the ordinary half-yearly general meeting of the Company on Aug. 31—Mr. W. B. Harrington presiding—showed that in the six months to June 30 £912 was expended from the depreciation fund, and that, after placing £1597 to the credit of that fund, the balance of profit and loss was £3180. A dividend was recommended at the rate of 6 p.ct. per annum. The Chairman said the half year's results were fairly satisfactory—due principally to the larger sale of gas for cooking and heating purposes. As they knew, there had been, for various reasons, a serious falling-off in the trade of the city, resulting in a much reduced use of gas for industrial purposes. The report was adopted, and the dividend declared.

TRADE NOTES.

"Pifco" Specialities.

From the Provincial Incandescent Fittings Company, Ltd., of "Pifco" House, High Street, Manchester, comes a copy of their season 1922-23 catalogue of lighting and heating goods, which incorporates the firm's leading specialities. There are illustrated various styles of "Protect-a-Lite" ("P.A.L.") patent unbreakable globes for gas, oil, and electric lamps, "Miller's" and other burners, and "Kinetic" hanging gas-lights to fit all universal or Graetzin burners. Attention is also drawn to a comprehensive variety of well-known patterns of incandescent inverted burners, globes, brackets, pendants, lamps, heaters, and sundry accessories in demand by gas companies, ironmongers, &c.

Aluminium Sections.

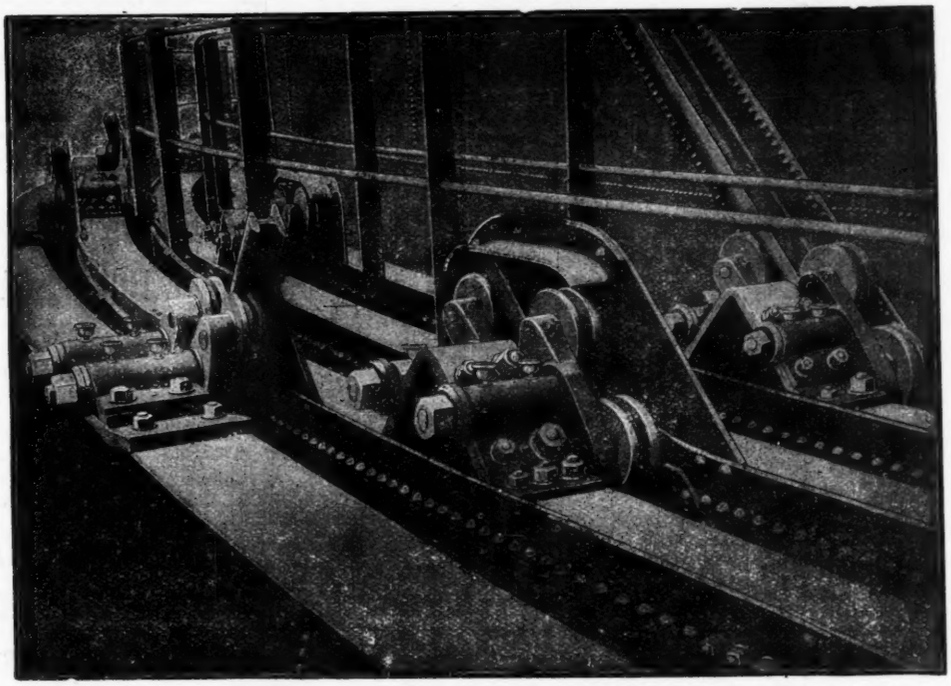
A wall calendar forwarded by the British Aluminium Company, Ltd., of No. 109, Queen Victoria Street, E.C., includes the sizes and weights of aluminium sections and sheets.

Small Tools.

In Section 1/8—a list which has just been published—Messrs. T. C. Jones & Co., Ltd. (Tool Department), Shepherd's Bush, London, W., furnish particulars of their small tools for engineering and general workshop use. The appliances quoted for are fully illustrated.

Hathersage and District Gas Company.—The annual report of the Company states that, after providing for depreciation, there was a profit for the year ended June 30 of £1793, making with the balance brought forward a sum of £2882. There has to be charged against this surplus the interim dividend of 2½ p.ct. and debenture interest, leaving for disposal £2286. The Directors recommend a final dividend of 6 p.ct., and that the sum of £200 be placed to reserve, leaving to carry forward £1183.

Wisbech Lighting Company.—A profit of £1967 on the half year's working was reported at the recent meeting of the Wisbech Lighting Company, under the presidency of Mr. Ward Lyle, a dividend of £10 p.ct. being declared on the ordinary stock (£3 certificates) and of 9½ p.ct. on the ordinary £5 shares. The Chairman stated that it was intended to make a reduction of 1d. per therm (nearly 5d. per 1000 c.ft.) in the price of gas to ordinary consumers, and the equivalent to users of prepayment meters, to take effect from Oct. 1. Should future profits permit, they would propose an additional reduction in the price of gas used for power purposes from Jan. 1 next. The cause of the advance in the price of gas had been due, he observed, to the higher cost of production. People were entirely in error in supposing it was owing to the new system of charging by the therm.



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MANCHESTER.

STOCK MARKET REPORT.

THE Stock Exchange has had an agitated week, and things were very dull and flat, influenced by the indecision of the Reparations Commission and the tightness of money, and prices fell freely. Relief came on Friday from the agreement arrived at by this Commission; and a favourable factor inside the House was the settlement of ante-war commitments. But the recovery in prices was but moderate. Home Government issues were hard hit. Friday's figures for the big four were: Consols 57½-57⅝. War Loan 99½-100½, Funding 86⅜-87⅛, Victory 87⅜-88¼. Home Rails had a marked fall.

The Foreign Market was much affected.

Business in the Gas Market showed a considerable falling-off in point of volume, and a large number of prominent issues were left unnoticed altogether. But the general tone was quiet; the market taking its own line, as usual, unperturbed by what was going on elsewhere. The London Companies were firm, and both Commercials rose 1. In the Suburban and Provincial group, Alliance and Dublin rose 2. Bournemouth 4 p.ct. debentures 10, and the three Sheffields 1½ each. In the Continentals, Imperial lost 7½ off its previous gain, and the debenture fell 2. European rose ½.

The following transactions in gas during the week were recorded: On Monday, Bombay 4⅞, British 30½, Commercial 4 p.ct. 96, Gas Light ordinary 95½, 95⅝, 95¾, 95⅞, 96¼, ditto maximum 63, 63¼, ditto preference 80⅜, Imperial Continental 145, 147, 148, 150, Primitiva 14s. 6d., 14s. 11½d., ditto preference 38s. 9d., 40s., 40s. 6d., South Metropolitan 95¼, 95½, 96, ditto 6½ p.ct. debenture 107½, South Suburban 98, Tottenham "B" 99⅜, Wandsworth, Wimbledon 98, British (Norwich) 3 p.ct. debenture 54, 54½. On Tuesday, Brighton and Hove original 167½, Continental Union 30, European 9⅜, 10, Gas Light ordinary 95¼, 95⅜, 95½, 95⅝, ditto debenture 62, 63, 63½, 63⅝, Imperial Continental 145, 148, Primitiva 15s., ditto preference 40s., 40s. 4½d., Sheffield "B" 96, 96¼, South Metropolitan 95½, Tottenham "B" 99, 99½, Wandsworth 4 p.ct. debenture 76⅜. On Wednesday, Bombay 4 15/16, Bristol 89 15/16, European 10⅛, Gas Light ordinary 95⅛, 95¼, 95⅜, 95½, 95⅝, ditto maximum 62½, 62⅝, ditto preference 80¾, Imperial Continental 143½, 146⅛, 147, 148, ditto debenture 73, Liverpool 5 p.ct. 89½, Primitiva 14s. 9d., ditto preference 39s. 9d., 40s. 6d., South Metropolitan 95¼, 95½, South Suburban 99, Brentford 7½ p.ct. debenture 103½, 104, Danish 5 p.ct. 52. On Friday, Bristol 89⅜, European 10 9/16, Gas Light ordinary 94⅜, 95, 95⅛, 95¼, 95½, 95⅜, ditto maximum 62¼, 62½, Liverpool 89½, Primitiva 15s. 3d., ditto preference 40s. 6d., 40s. 9d., 41s. 3d., South Metropolitan 95¼, 95½, ditto 3 p.ct. debenture 62, ditto 6½ p.ct. debenture 106½, Lea Bridge 7 p.ct. debenture 103, Swansea 7 p.ct. preference 104, 104½, Wakefield 5 p.ct. 88, ditto 5 p.ct. maximum 77½, Wolverhampton 8 p.ct. debenture 105½, Danish 75s., 78s. 9d., 80s., ditto 4 p.ct. debenture 60.

In the Money Market, tightness manifested itself from the start, and this continued to prevail down to the close of the month, when the position was materially relieved. Discount terms were hard up to the end of the week. Silver was unchanged. The Bank of England rate was 3 p.ct., as fixed on July 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
182,049	Stk.	Aug. 24	4	4%	Aldershot 4 p.c. Pref.	..	70—75*	...
1,551,868	,,	Apl. 12	2½	3 1/8%	Alliance & Dublin Ord.	59—64	62—67	...
374,000	,,	July 13	4	4%	Do. 4 p.c. Deb.	76—79	60—65	...
280,000	5	May 18	7½	7½%	Bombay, Ltd.	5¼—6¼	4¾—5	4⅞—4 15/16
100,000	5	Aug. 10	16	7½%	Bournemouth Gas and Water: 5 p.c.	..	11—12	...
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	10½—11¼	...
115,000	10	,,	6	6%	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	8—9	...
162,065	—	June 29	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	..	73—78	...
992,045	Stk.	July 27	14	6l/-	Brentford A Consold.	261—266	93—98	...
734,920	,,	,,	11	6l/3	Do. B New	204—209	93—98	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	82—87	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	75—80	...
214,775	,,	Aug. 24	11	11%	Brighton & Hove Orig.	208—213	165—170*	167½
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	120—125*	...
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	89½—89 15/16
530,000	20	Mch. 15	12½	10%	British	44—45	30—32	30½
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	76—80	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—58	...
100,000	10	June 1	—	7%	Cape Town & Dis., Ltd.	1¼—2¼	6¾—7¾	...
100,000	10	Apl. 27	—	4½%	Do. 4½ p.c. Pref.	4—6	6—6½	...
100,000	Stk.	June 29	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	73—78	...
137,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 27	5/9/4	56/-	Commercial 4 p.c. Stk.	106—108	93—98	95½—96
560,000	,,	,,	5½	55/-	Do. 3½ p.c. do.	103—105	93—98	...
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	55—60	...
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	30—40	30
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	55—60	...
51,600	,,	Feb. 23	15	15%	Croydon A 10 p.c.	..	..	...
278,400	,,	,,	12	12%	Croydon B and C 7 p.c.	..	..	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	80	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	65	...
1,002,180	10	July 13	10	5/0	European, Ltd.	17½—18	9⅜—10⅛	9⅜—10 3/16
16,298,975	Stk.	July 27	4/17/4	52/-	Gas: 4 p.c. Ord.	98—102	95—97	94⅜—96⅛
2,600,000	,,	,,	,,	35/-	Light: 3½ p.c. max.	76—79	61—64	62—63½
4,062,235	,,	,,	4	4%	and: 4 p.c. Con. Pref.	96—99	78—81	80—80⅜
4,674,850	,,	June 15	3	3%	Coke: 3 p.c. Con. Deb.	72½—74½	62—65	62—62⅜
130,000	,,	Dec. 11	10	10%	Coke: 10 p.c. Bonds	..	..	...
82,500	,,	Sept. 14	5	3½%	Hastings & St. L. 5 p.c.	..	78—81	...
258,740	,,	Mch. 15	3½	2½%	Do. 3½ p.c.	87—89	60—63	...
70,000	10	May 18	11	5%	Hongkong & China, Ltd.	16½—16¾	6—7	...
86,600	Stk.	Aug. 24	9	9½%	Hornsey 7 p.c.	..	127—132*	...
131,000	,,	Aug. 10	7½	7½%	Ilford A and C	151—154	..	...
65,780	,,	,,	6½	5½%	Do. B.	115—118	..	...
65,500	,,	June 29	4	4%	Do. 4 p.c. Deb.	92—94	..	...
1,976,000	,,	May 18	9	10%	Imperial Continental	150—160	140—150	143—150
404,800	,,	Aug. 10	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	70—75	70—73
235,242	,,	July 27	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. A.	211—213	..	89½
					Liverpool 5 p.c. Ord. B.	146—148	..	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	...
165,736	,,	Aug. 10	7/5/6	87/3	Maidstone 5 p.c.	..	87—92	...
63,480	,,	June 29	—	3%	Do. 3 p.c. Deb	..	54—59	...
75,000	5	,,	6	6%	Malta & Mediterranean	4¼—4½	3½—3¾	...
250,000	100	Apl. 3	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	97—98	...
541,920	Stk.	June 1	4	4%	Monte Video, Ltd.	11½—12	63—68	...
1,875,892	,,	July 27	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	80½—81½	...
529,705	,,	June 29	3½	3½%	Do. 3½ p.c. Deb.	82—83	68—70	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	12½—13	...
55,940	10	Aug. 24	7/14/0	7/8 5/8	,, ,, 7 p.c.	14—15	10½—11¼*	...
300,000	Stk.	May 18	8	8%	Oriental, Ltd.	117—122	92—97	...
60,000	5	—	10	—	Ottoman, Ltd.	7½—7¾	2—3	...
188,120	Stk.	June 29	—	6/3/9%	Plym'th & Stonh'se 5 p.c.	..	93—98	...
60,000	50	Aug. 24	13	65/-	Portsea Island, B	128—131	100—105*	...
100,000	50	,,	12	60/-	Do. C	118—121	85—90*	...
249,980	5	—	8	—	Primitiva Ord.	5¼—6	⅞—1	14/6—15/3
499,960	5	—	5	—	Do. 5 p.c. Pref.	4¾—5	1⅞—2⅛	38/9—41/3
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	70—75	...
600,000	Stk.	July 27	4	4%	Do. ,, ,, 1911	..	55—60	...
346,198	,,	June 29	4	4%	River Plate 4 p.c. Deb.	85—87	53—58	...
150,000	10	Mch. 30	6	6/-	San Paulo 6 p.c. Pref.	10¼—11	5¼—6¼	...
125,000	50	July 3	5	5%	San Paulo 5 p.c. Deb.	47—49	35—38	...
135,000	Stk.	Aug. 24	10	5%	Sheffield A	223—224	95—97*	...
209,984	,,	,,	10	5%	Do. B	222—224	95—97*	96—96½
523,500	,,	,,	10	5%	Do. C	220—222	95—97*	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	June 29	9	7½%	South African	10¼—11¼	7—9	...
6,609,895	Stk.	July 27	5/4/0	5%	South Met. Ord.	111—113	94—97	95¼—96
250,000	,,	July 13	—	5%	Do. Red. Pref.	..	94—96	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	61—64	62
224,820	,,	Aug. 24	8½	8½%	South Shields Con. Stk.	157—159	106—108*	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	97—100*	98—99
368,837	,,	June 15	5	5%	Do. 5 p.c. Deb. Stk.	116—118	95—100	97—98½
647,740	,,	May 18	5	5%	Southampton Ord.	99—102	75—80	...
121,275	,,	June 29	4	4%	Do. 4 p.c. Deb. Stk.	..	63—68	...
120,000	,,	July 27	—	7½%	Tottenham A 5 p.c.	135—138	110—115	...
782,275	,,	,,	6	6%	Tottenham B 3½ p.c.	115—117	97—102	99—99½
181,255	,,	June 15	4	4%	Tottenham District 4 p.c. Deb.	87—89	75—80	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Aug. 24	5	2½%	Tynemouth 5 p.c. max.	108½—109	73—75*	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 27	8½	72/6	Wandsworth A 5 p.c.	151—156	111—115	...
255,636	,,	,,	6½	57/6	Do. B 3½ p.c.	129—134	95—100	...
108,075	,,	,,	—	50/9	Do. C.	..	85—90	...
140,865	,,	,,	—	50/9	New Ordinary	..	85—90	...
352,000	,,	,,	6½	53/9	Wimbledon 5 p.c.	117—122	95—100	98
98,000	,,	,,	6½	58/9	Epsom 5 p.c.	121—126	95—100	...
88,426	,,	June 29	3	3%	3 p.c Deb. Stk.	66—69	57—60	...

* Ex Div.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 4.

Pitch and creosote continue the chief items of interest in the coal tar products market. Business is offering freely; but makers are selling very cautiously. Pitch is firm at 85s. per ton, and creosote at from 6¾d. to 7d. per gallon. Tar for road work continues to go out in considerable quantities; and the price for this article is firming-up in sympathy with pitch and creosote. Pure benzole and pure toluole are steady at about 2s. 6d. per gallon; while 95-160 solvent naphtha is quiet at 2s. 3d. to 2s. 4d. per gallon.

Other products remain without change.

Tar Products in the Provinces.

Sept. 4.

The average values for gas-works products during last week were: Gas-works coal tar, 48s. to 53s. Pitch, East Coast, 82s. 6d. to 83s. 6d. f.o.b. West Coast—Manchester, 76s. to 77s.; Liverpool, 77s. to 78s.; Clyde, 78s. to 79s. Benzole 90 p.ct. North, 2s. to 2s. 1d.; crude 65 p.ct. at 120° C., 1s. 1½d. to 1s. 3d. naked at makers' works; 50-90 p.ct., naked, North, 2s. to 2s. 1d. Toluole, naked, North, 2s. to 2s. 3d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9¼d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 2s. to 2s. 1d. Creosote, in bulk, North, liquid, 6d. to 6½d.; salty, 5½d. to 5⅝d. Scotland, 4⅝d. to 5d. Heavy oils, in bulk, North, 6½d. to 6¼d. Carbolic acid, 60 p.ct., 2s. to 2s. 1d. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Manchester District Tar Prices.

The average price realized for the sale of tar in the Manchester district, according to the sliding-scale, for the month of July was £2 15s. 5·15d. per ton.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

A very firm tone continues in the market for tar products, particularly in pitch; while there are also signs that carbolic acid is coming to the front. Pitch remains firm, and manufacturers anticipate a further advance on the current range of 80s. to 90s. per ton; the latter price, delivered at consumers' works, having been obtained in South Wales, where the demand continues very strong. There is a large inquiry for pitch for forward delivery, and most of the improvement is brought about as a result of inquiries from the Continent. In carbolic acid, makers of crudes are trying for 2s. per gallon; but crystals do not rise above 6d. per lb. There is, however, an American demand for crystals just springing up which may materially alter the situation shortly. American buyers are also in the market for creosote, which is firm at 6d. per gallon. Cresylic acid shows no material change since last quoted at 2s. 2d. to 2s. 4d. for pale 97-99 p.ct. Dark 95-97 p.ct. is 2s. per gallon on rail. Solvent naphtha is quoted at about 2s. per gallon; and there is no change in heavy naphtha. As regards benzole, there has been a better demand of late, and the market is possibly slightly firmer at 2s. per gallon, despite the fact that the demand for motor purposes will shortly fall off. Further, the recent large imports of petrol bring the quantity imported this year to over 200 million gallons, which keeps the market well supplied with motor fuel. Naphthalenes are weak, although there has been no definite change in quotations since the last report. Business in intermediate products remains practically unchanged, and not much change can be expected until some improvement occurs in the market for dyes. Aniline oil and salt have been inquired for on export account, at 1s. 1d. and 1s. 2d. per gallon respectively. Anthracene 40 to 50 p.ct. is quoted at 9d. per unit; resorcin 6s. per lb. for technical grade; beta naphthol 1s. 5d. per lb.; and salicylic acid 1s. per lb. for technical grade.

Sulphate of Ammonia.

The position in sulphate of ammonia shows no change, although there is a slight increase in the export trade, and values have advanced in accordance with the restricted supplies. Export prices are now in the neighbourhood of £18 per ton; while for home delivery during September and October £16 8s. per ton is the official figure for 25¾ p.ct. neutral quality. Ordinary 25¼ p.ct. quality is quoted at £15 5s. for the same deliveries. The world-wide shortage upon which comment has been made in previous reports is likely to bring about an advance in the home quotations; and it would not be surprising to find home prices towards the end of the season (say March to May next) in the neighbourhood of £17 to £18 per ton.

Nenagh Gas and Electricity Supply.—At a meeting of shareholders of the Nenagh (co. Tipperary) Gas and Electricity Supply Company, a Committee who had been appointed to investigate the Company's affairs reported that an embarrassing position which had arisen was due to inopportune launching of the project at a time when money had reached the highest inflation, lack of supervision by responsible officials during construction, under-capitalization, and uneconomic working. It was pointed out that the wages bill (£2000) was altogether out of proportion to the revenue of £3000. A new salaries scale was suggested. A matter of £4000 for trade creditors could be dealt with by the raising of more capital or a further advance from the bank, or by the issuing of short-dated debentures to principal creditors. A recommendation was made that payment of dividend on the preference shares should be deferred. The report was adopted, and it was decided to circularize the shareholders as to their views on the action to be taken.

The Sir John Cass Technical Institute.—The new session of the Sir John Cass Technical Institute, Jewry Street, Aldgate, E.C. 3, will commence on Monday, Sept. 25. Students will be enrolled during the previous week, commencing Monday, Sept. 18, between 6.30 and 8.30 p.m. The courses of instruction at the Institute meet the requirements of those engaged in chemical, metallurgical, electrical, petroleum, and the fermentation industries. Full facilities are provided in the well-equipped laboratories of the Institute for special investigations and research. The instruction in experimental science also provides systematic courses for the examinations of London University and of the Institutes of Physics and Chemistry. Special courses of higher technological instruction form a distinctive feature of the work of the Institute, and for the forthcoming session these include brewing, malting, micro-biology, petroleum technology, colloids, alternating currents and electrical oscillations, mathematical statistics, metallography and pyrometry, heat treatment and mechanical testing of metals and alloys, and foundry practice.

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Continued on p. 544.